# PUBLIC WORKS

Dec. 1952

## CITY, COUNTY AND STATE


Underwater Inspection of Ocean Outfall Sewer

Design Data for Street Lighting Engineering

Parking Meters Pay the Traffic Control Bill

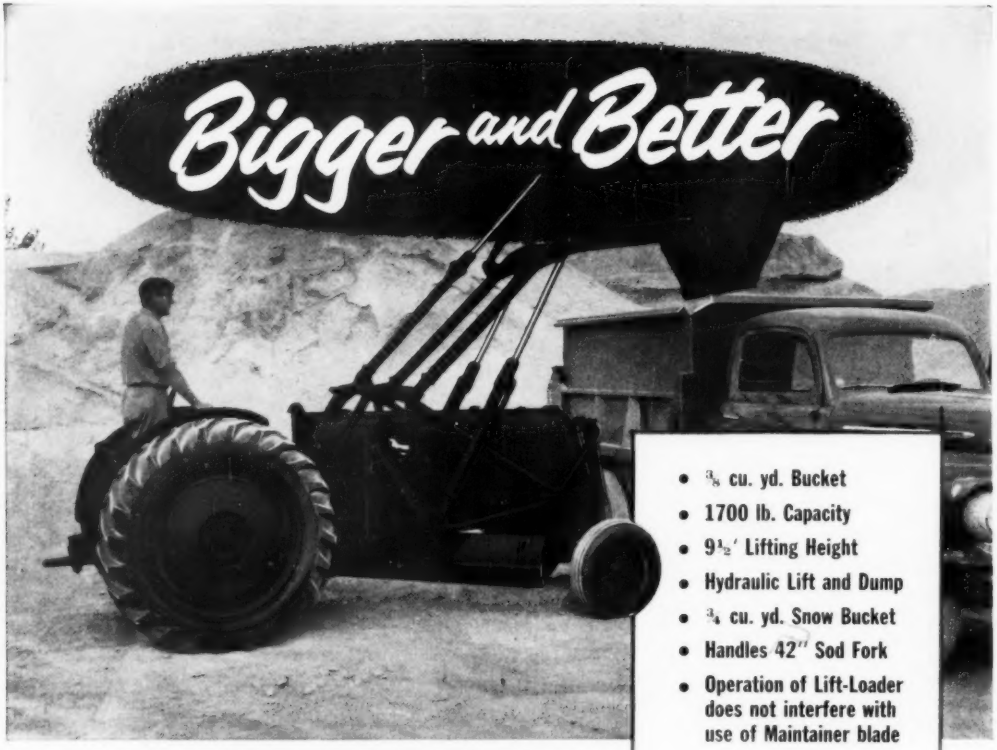
Enzymes Aid Overloaded Sludge Digester

Small Town Rehabilitated by New Water Plant

Sanitary Fills Pay Off In Seattle

Dual Fuel Engines Cut City Power Costs

Samuel P. Turnbull, State Highway Engineer of Florida, has risen from rodman to chief engineer in 27 years. More about him on page 26.




- ⅜ cu. yd. Bucket
- 1700 lb. Capacity
- 9½' Lifting Height
- Hydraulic Lift and Dump
- ¾ cu. yd. Snow Bucket
- Handles 42" Sod Fork
- Operation of Lift-Loader does not interfere with use of Maintainer blade

# HUBER LIFT-LOADER

Give your jobs a REAL lift with the bigger, better HUBER lift-loader.

It travels around like a pick-up truck, and converts easily from a ⅜ cubic yard material handling loader to a ¾ cubic yard snow bucket or a 42" sod fork.

Its 1700-lb. lifting capacity makes short work of big jobs. The HUBER's ability to dump 45 inches ahead of the front wheels makes it easy for the operator to spot his loads. And it is operated hydraulically, including control of the bucket.

There's a BIG BONUS in other HUBER attachments which make the Maintainer a bulldozer, highway mower, berm leveler, road planer, snow-plow, broom or patch roller.

Get the details on this versatile 6,000-lb., 42½ H.P. machine from your nearest HUBER Distributor.

**HUBER MANUFACTURING CO. • Marion, Ohio, U. S. A.**
Manufacturers of Huber Maintainers, Graders and Complete Line of Rollers

HUBER

CHICAGO SEWAGE EQUIPMENT

# Chicago INDUSTRIAL WASTE TREATMENT

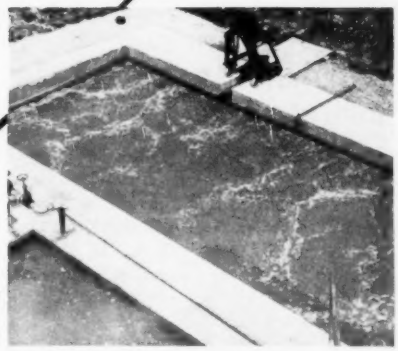
SERVING OVER 100 INDUSTRIES

For many years Chicago Pump Company has worked with consulting engineers, research groups and plant managers developing practical and economical solutions to Industrial Waste Treatment problems. The first objective has been the development of a successful process. Then, where practical, existing equipment has been used or new equipment developed to meet the requirments of the process. As a result, engineers and plant owners have had completely satisfactory results with Chicago equipment. Chicago Pump solicits inquiries from your consulting engineers regarding your own industrial waste treatment problems.

**SOME TYPICAL APPLICATIONS UTILIZING CHICAGO INDUSTRIAL WASTE EQUIPMENT:**

- canning wastes
- dairy and cheese wastes
- grease removal
- grit removal
- wastes from laundries
- metal processing wastes
- ordnance plants
- packing houses
- textile plants
- pharmaceutical plants

G. A. Wintzer & Son Company, Wapakoneta, Ohio. Packing house waste. Paul A. Uhlmann & Associates, Engineers.



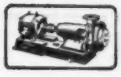
Cherry Grove Dairy, Toledo, Ohio. Milk wastes. L. Lewandowski & Son, Engineers.

Potato Chip Corporation of America, Cato, New York. Starch and grit removal.

## CHICAGO PUMP COMPANY

**SEWAGE EQUIPMENT DIVISION**

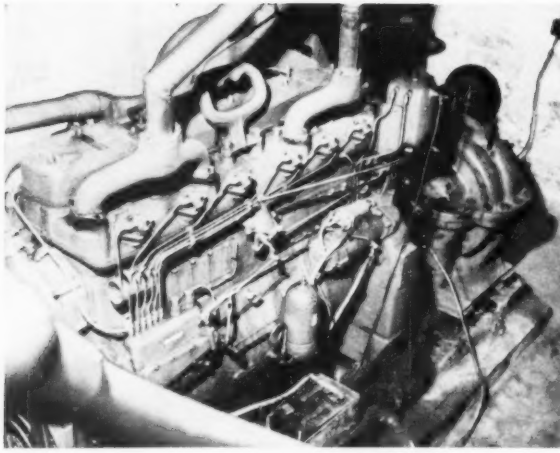
**622 DIVERSEY PARKWAY** — **CHICAGO 14, ILLINOIS**



Flush Kleen, Scru-Peller, Plunger, Horizontal and Vertical Non-Clog Water Seal Pumping Units, Samplers.

Swing Diffusers, Stationary Diffusers, Mechanical Aerators, Combination Aerator-Clarifiers, Comminutors.

# How a City Weatherproofed its Water Supply



**EMERGENCY ENGINE.** Hickory city officials know that, in case of power failure, this International UD-24 pumping engine will start right off and be pumping water in less than two minutes time.

**PRODUCTION IS PROTECTED.** Hickory's ultra-modern 4,900 g.p.m. pumping station is no longer vulnerable to electric power failures since the UD-24 diesel engine has been installed on a standby basis.

## HICKORY, NORTH CAROLINA, USES INTERNATIONAL UD-24 ENGINE AS STANDBY UNIT IN PUMPING STATION

They do more than just talk about the weather in Hickory, North Carolina. The city's water supply is no longer vulnerable to whims of the weather since city council members weatherproofed the system by purchasing an International UD-24 diesel engine as a standby unit in the municipal pumping station supplying 17,000 Hickory residents and the 1,700 folks in suburban Longview.

Now if high winds, lightning or sleet storms knock out transmission lines leading to two 350 horsepower electric motors in the 4,900 g.p.m. pumping station, the UD-24 engine goes into action and drives a two-stage pump which supplies 2,000 gallons of water per minute to take care of emergency requirements.

Call in your International Industrial Distributor or Power Unit Dealer today for full details on why International engines do more work at lower cost. You'll discover that the shortcut to delivering extra public services on a fixed budget is with International "Power that Pays."

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**CHICAGO 1, ILLINOIS**

**INTERNATIONAL** POWER THAT PAYS

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PUBLIC WORKS MAGAZINE

Edited by W. A. Hardenbergh and A. Prescott Folwell

# CONTENTS

DECEMBER, 1952


Parking Meters Pay the Bill. By Guy Browning Arthur ..... 57
Procedures and Hazards in Ocean Outfall Inspection. By F. R. Bowerman 60
50 Per Cent Reduction in Power Cost ..... 62
Salt Well Furnishes Brine for Water Softening. ..... 63
How We Save Money on Snow and Ice Control. By A. E. Stanton ..... 65
Street Lighting Engineering ..... 66
How Enzymes Improved Sludge Digestion. By A. C. Bryan ..... 69
New Water Plant Rehabilitates Town. By J. L. Morrison ..... 71
Financial Mathematics of Water Main Extensions. ..... 72
Dual Fuel Conversion Cuts Power Costs to Record Low. ..... 73
Industrial Wastes—A Community Problem. By E. B. Besselievre ..... 74
Rubber Asphalt Pavement Test in Milwaukee. By John Hubel ..... 77
Sanitary Fills Pay Off in Seattle. By R. F. Karolevitz ..... 78
How to Get More Service From Industrial Hose. By J. A. Muller ..... 80
Atrocious Timing But Still Needed. ..... 82
New Floor, Plus Beam Reinforcement Makes New Bridge. ..... 82
If You Need to Dredge a Reservoir, This Will Help ..... 86
Machines Do The Work Faster and Cheaper. ..... 90
Tar, Tar-Rubber and Other Paving Developments. ..... 92
Reinforced Concrete Box Girders Solve Four Problems. ..... 99
Cost of Laying Water Pipe in St. Louis ..... 100
Cost of Laying Water Pipe in Hartford. ..... 100


## PUBLIC WORKS DIGESTS


The Sewerage and Refuse Digest. ..... 101
The Highway and Airport Digest. ..... 109
The Water Works Digest. ..... 115


## DEPARTMENTS AND SECTIONS


The Editor's Page. ..... 7
Leo Ritter. ..... 16
"Doc" Symons. ..... 18
Letters to The Editor. ..... 20
Leaders in Public Works ..... 26
The Engineers' Library ..... 32
APWA News Letter. ..... 83
Washington News. ..... 84
Public Works Engineering Data 98
New Public Works Equipment. 124
Books in Brief. ..... 127
Worth Telling. By A. K. Akers 130


*The 1952 volume of Public Works will be available on microfilm through University Microfilm, 313 N. First St., Ann Arbor, Mich.*

THE ENGINEERING AUTHORITY IN THE CITY-COUNTY-STATE FIELD

PUBLIC WORKS JOURNAL CORP.
310 East 45th St., New York 17, N. Y.

# They picked this pipe when salt and sewage "ganged up"

A large New England city recently installed a 1600-foot outfall sewer with its outlet end 35 feet under salt water. The pipe selected for this job was Armco ASBESTOS-BONDED Corrugated Metal Pipe.

Thus the engineers provided utmost protection against the severe corrosion of both salt water and sewage. Millions of asbestos fibers embedded in the galvanized coating and saturated with a bituminous seal coat guard the base metal—assure long, economical service.

Another reason for selecting Armco ASBESTOS-BONDED Pipe was its ease and economy of installation. The inherent flexibility of the pipe saved designing expensive and complicated foundation supports. Standard 20-foot lengths were joined into 100-foot units, then lowered into place on the coarse sand bottom. Only a few joints had to be assembled under water. And the sturdy coupling bands made the joints as tight and strong as the durable ASBESTOS-BONDED Pipe itself.

For less corrosive conditions, plain galvanized Armco Corrugated Metal Pipe or MULTI-PLATE Pipe will handle the job. Where erosion is a problem Armco PAVED-INVERT Pipe is best. And for limited headroom there is standard Armco Pipe-Arch or MULTI-PLATE Pipe-Arch. Write for complete data. Armco Drainage & Metal Products, Inc., 4282 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

• • •

**Lowering 100-foot units of Armco ASBESTOS-BONDED Pipe, assembled from standard 20-foot sections, for coastal outfall sewer.**

**ARMCO DRAINAGE STRUCTURES**

ARMCO

# THE EDITOR'S POINT OF VIEW

### If There Are as Big Fish in the Sea . . .

IF there are as big fish in the sea as have ever been caught, then certainly there are as good ideas yet to come as have ever been thought of. That has long been one of our texts here at PUBLIC WORKS. We believe that the potential of usefulness of an engineering magazine has not yet been approached and we are determined that we shall always work toward this end.

Over the past years we have, we believe, done a great deal to make this magazine of wide usefulness to the profession we serve. We have not hesitated to speak out boldly for the benefit of the men in this field whenever occasion seemed to require. We have striven to imbue our operations with the spirit of helpfulness and concern for all. We look forward to 1953 as an opportunity to progress even farther in our chosen field of service.

Last month we announced two new features for better service to our readers. Next month, we will have another announcement to make along the same lines. But these are only the surface indications of our determination to make this magazine constantly better, more useful, more modern in thought and appearance and more helpful to all.

We have appreciated greatly the almost countless messages of encouragement, of understanding and of good will that have come to us. They will help us to do an even better job in the future.

### We Need Someone to Fight for Engineers—Not Just More Societies

OUT at the American Public Health Association meeting in Cleveland there was talk of a new society for sanitary engineers, now more or less split among several technical societies. At other meetings and in other fields, there have been discussions of more technical groups of this sort.

In your editor's opinion, we need some organized group that will fight for engineers—not just more technical groups that will turn out more and more technical papers. For more than five years your editor had the responsibility for the utilization—and the watching over and for—of more than a thousand army sanitary engineer officers, and of two thousand other professionally trained officers. It was easy to get technical advice; it was easy to get any kind of help, except someone who was willing to go to the mat for the benefit of these officers. It is but simple justice to say here that Joe Gilbert, my principal assistant, alone did more for the down-to-earth benefit of these officers than all of the organized engineering groups and societies put together.

It is interesting to try to guess how much better off these engineers would be to-day (and the Army, too) if we had had such support. It is far past time that we had someone who is not afraid to fight and who knows how to fight. We need that more than we need bigger and better technical discussions. We need to show the engineer a bit about fending for himself; and we need someone to back him up when he needs help.

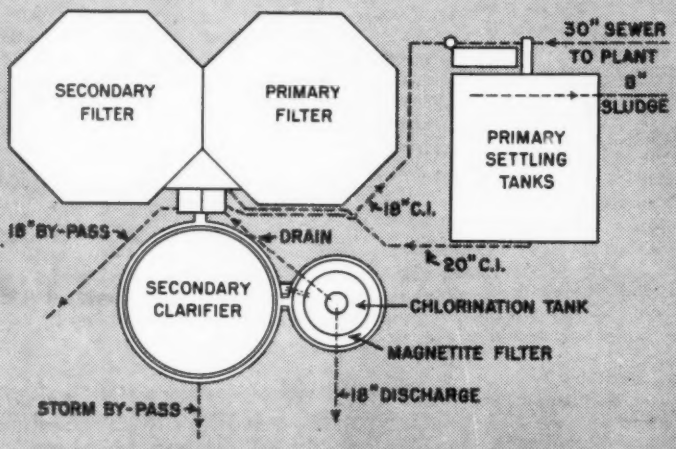
### Dr. Rudolfs to Retire After a Notable Career

AT the close of this year, Willem Rudolfs will retire. Through the years he has made innumerable contributions to the field of sanitary engineering. To his work he has brought a freshness of thought, good sense and good judgment, sometimes humor, and always understanding and practicality. The very contributions he has made should, and we hope will, simplify the problem of his replacement, for no man has done more toward developing the younger generation of engineers. It is with much regret that we note his plans for retirement and we wish him much pleasure during his projected long vacation in Holland. Our sincere thanks for his many contributions, and our best wishes for the future.

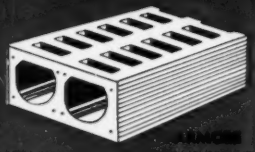
### Merry Christmas and a Happy New Year to Our Readers

THE necessities of publishing on a schedule make it imperative that we be a little forehanded in holiday greetings to our readers. But that lessens neither the warmth nor the sincerity of our wishes to you all for a Merry Christmas and a Happy New Year. And whatever we can do personally toward that end we shall be happy to do. Here's to you all, wishing you the best year you have ever had.

# After 12 Years Still Better




LAYOUT OF SEWAGE TREATMENT PLANT
LIBERTY, N.Y.



## 1 USE TFF INSTITUTE SPECIFICATIONS UNDERDRAINS

The scientific design of these *vitrified clay filter bottom blocks* insures trouble-free operation for the life of the filter. They have large top openings. That means proper ventilation of all filter media and free discharge of the filter effluent at all times. They have smooth run-off channels. That means quick drainage and no clogging even with years of operation. The blocks are light in weight, self-aligning and easy for unskilled labor to lay. After they have been laid they are strong enough to work on and to support even very deep filter media.

These modern underdrain blocks will carry applications up to 50 MGAD. They are best for all kinds and shapes of filters. They are used everywhere better operating results are desired.

Use them to insure best results from your next trickling filter. Give it a *specification* floor. Use TFFI *vitrified clay filter bottom blocks*. For full engineering details write any member of this Institute today.

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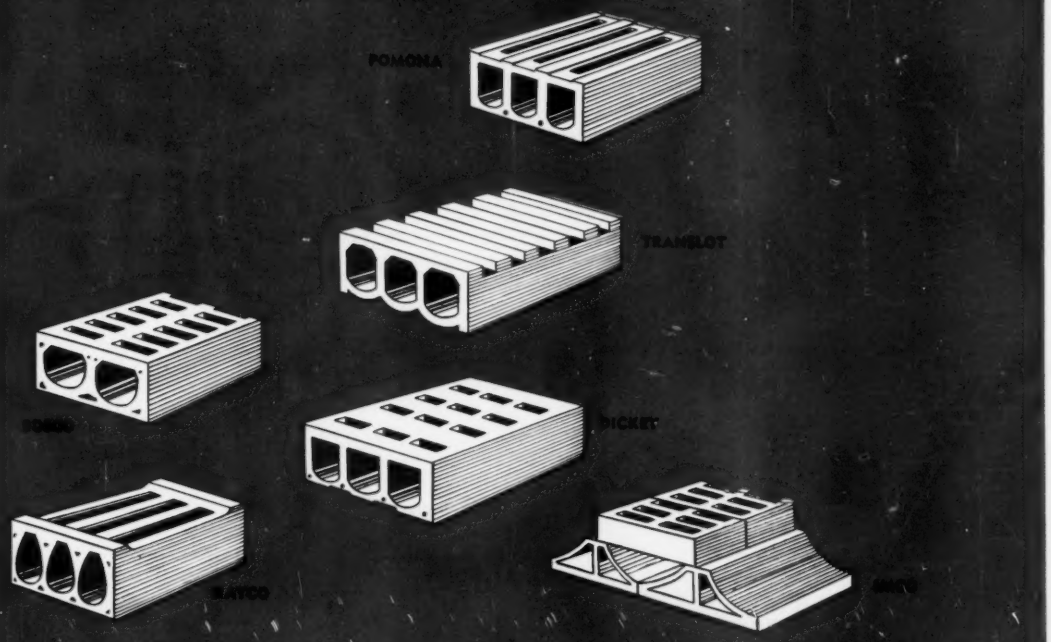
# *Trickling Filter Results*




**2** **GOOD EQUIPMENT AND MATERIALS PAY OFF AT LIBERTY**

The Liberty sewage treatment plant was completed in 1940 and used TFFI *specification* underdrains in its filters. A typical day of 1952 illustrates the results this plant has produced over the past 12 years of continuous operation: Flow 1.2 mgd—it was designed for 1.1 mgd; raw sewage BOD 400; secondary clarifier effluent 21 ppm BOD; final effluent 12 ppm BOD. Link-Belt primary settling tank equipment; Dorr distributors; Dorr secondary clarifier equipment.

## TRICKLING FILTER FLOOR INSTITUTE

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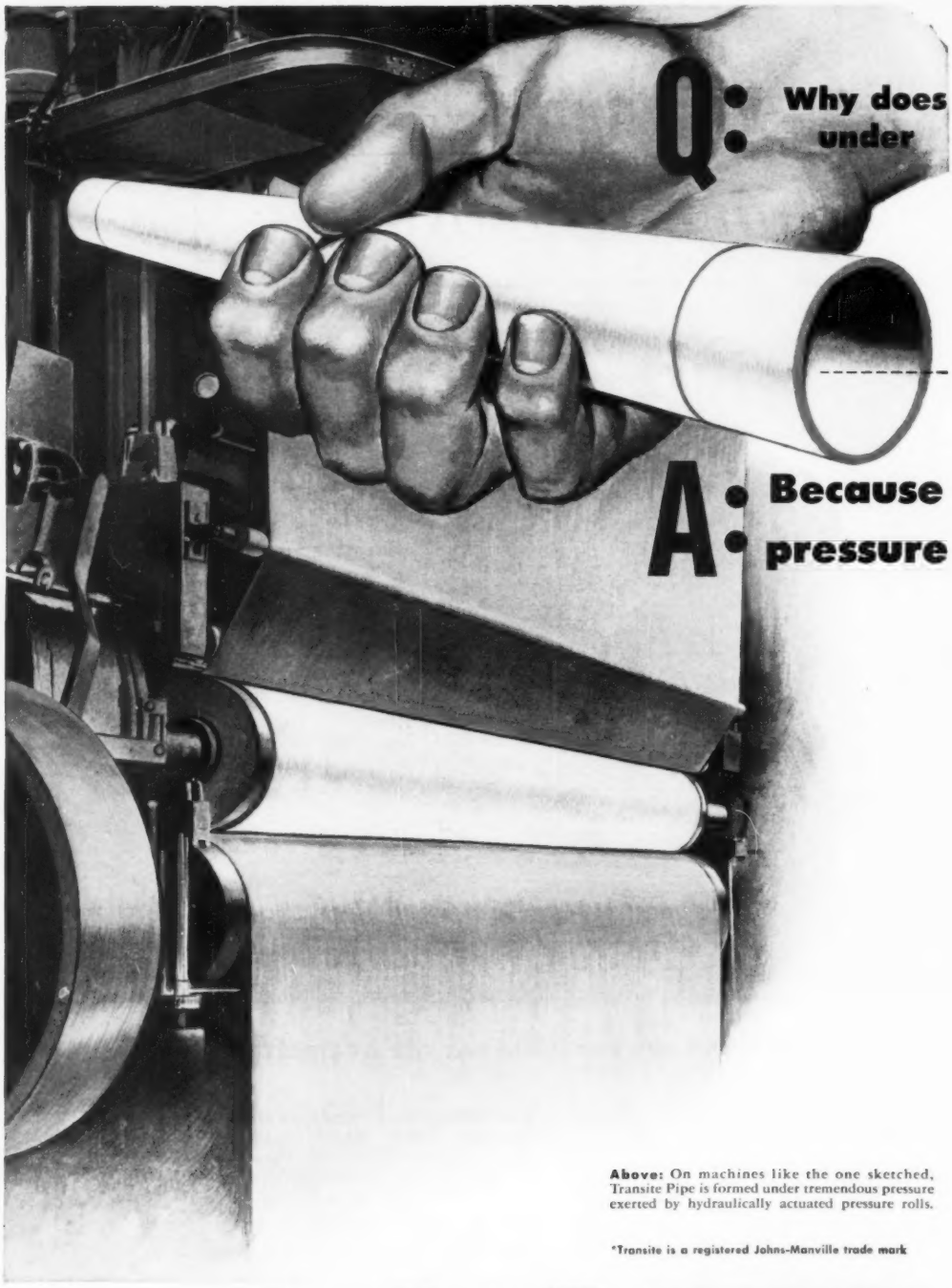


**Above:** On machines like the one sketched, Transite Pipe is formed under tremendous pressure exerted by hydraulically actuated pressure rolls.

*Transite is a registered Johns-Manville trade mark

# Johns-Manville TRANSITE

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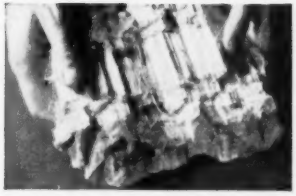
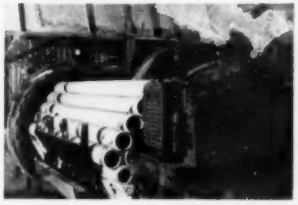
## TRANSITE PIPE last longer these Texas city streets?

**The water system** in this fast-growing Texas city is a tribute to the lasting strength and corrosion resistance that enable Transite Pipe installations to outlast other pipe under busy city streets. The first Transite mains were installed here in 1939 to replace previously used pipe which had a service life of approximately seven years. So successful was this original installation that today, virtually the entire supply and distribution system consists of Transite mains.

# it's formed under tremendous for lasting strength



Tough, strong asbestos fibers reinforce Transite Pipe—contribute to its exceptional corrosion resistance and lasting strength.



The pressure steam curing process—another reason why Transite Pipe survives corrosive attack and stays strong in service.

Transite's tight, flexible Simplex Couplings help relieve the line of excessive flexural stresses and safeguard against leakage and resulting undermining effects on water mains.

Yes, it's the all-important quality of *lasting strength* that enables Transite* Pressure Pipe to stand up under conditions highly adverse to ordinary pipe—as typified by the Texas city installation shown in the photograph above.

One of the reasons why Transite Pipe has this exceptional ability is the process used in its manufacture.

On specially designed pipe-forming machines, the materials that go into its making—asbestos, cement and silica . . . are consolidated under heavy pressure into a tough, dense homogeneous pipe wall structure. And reinforcing this structure . . . distributed uniformly throughout each length of pipe . . . are countless indestructible fibers of asbestos with a tensile strength comparable to that of steel. *No wonder this modern asbestos-cement pipe is strong and stays strong through the years!*

And no wonder thousands of American cities and towns have found it the answer to today's need for a pipe that assures the greatest possible return on waterline investments. For in addition to those economies resulting from lasting strength, Transite Pipe also provides other important savings. Its light weight and easy handling reduce installation costs. Its tight, flexible Simplex Couplings cut down on costly leakage losses. Its smooth interior assures a high coefficient of flow (C=140) and, because Transite cannot tuberculate, helps keep pumping costs permanently low through the years.

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JOHNS MANVILLE JM PRODUCTS

# asbestos-cement PRESSURE PIPE

Get full details of this month's new products . . . mail your Readers' Service card today.

The big power and capacity of the T7 TRAXCAVATOR Shovel speed the placing of the earth cover on the refuse layers. The T7 has a 2-cu. yd. bucket for this work.

Broad tracks and deep grousers enable the T7 to work year around in all ground conditions. Refuse is compacted quickly.

# HOW A TRAXCAVATOR® SHOVEL SOLVED A CITY'S REFUSE PROBLEM

## *T7 Picked for Landfill Operation*

When an efficient sanitary landfill went into operation at Kansas City, Kansas, a T7 TRAXCAVATOR Shovel was chosen to do the heavy work.

Trees had to be felled, land cleared, trenches dug, material stockpiled, before the system could be started. The T7, with over 23,000 pounds of drawbar push, and geared to the ground by deep grousers, dug in, excavated around and pushed over big trees. The hilly terrain was cleared and access roads built by the T7's versatile power. Then gullies were deepened and the material removed was stockpiled for use as cover material.

### Handling the Dump

With all preliminary work quickly accomplished, dumping started. The refuse was dumped into the deep pits and the T7 spread and compacted it at the same time. A cover layer of earth was carried and spread over the refuse by the TRAXCAVATOR Shovel. The big, 2 cubic yard bucket made short work of the earthmoving tasks.

Today, the waste lands are attractive areas and the landfill operations are going on a short distance away—with the able management of one man on the TRAXCAVATOR Shovel seat.

### Kansas City Official Pleased

Supervisor of Public Health Works, Ralph Lawless, says, "We needed a machine that could dig, carry, bulldoze, load, spread, compact, and grade – that's why we picked a TRAXCAVATOR Shovel. The T7 makes the toughest work easy. It transformed a dangerous, unsightly dump into a clean, useful area . . . and it does its work at a big saving to taxpayers. Its loading features make it an excellent emergency tool for snow removal and other municipal tasks."

### For Your City, Too!

These big TRAXCAVATOR Shovel advantages can go to work for your community, regardless of its size and problems. Conveniently-located "Caterpillar" Dealers have trained men who can help you inaugurate the system. They will be glad to meet with representatives and officials of any town or city interested in sanitary landfill. Call on them . . . let them show you a community that is successfully operating a landfill dump with a TRAXCAVATOR Shovel . . . let them give you full details on the construction, operation and multi-job features of the TRAXCAVATOR Shovel model that fits your needs –there are five job-proved models with capacities ranging from ½ to 4 cu. yds. Call on your Caterpillar Dealer . . . or write direct.

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**Peoria, Illinois**

**TRACKSON**
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A SUBSIDIARY OF CATERPILLAR

**TRAXCAVATOR® SHOVELS**
**TRACLOADERS**
**PIPE LAYERS**
**ANGLEFILLERS**

Now's the time to mail this month's Readers' Service card.

Amanda Park, one of three villages served by the Quinault Light Co., Quinault, Washington. A "Caterpillar" D397 Electric Set, capable of 280 KW 24 hours a day, every day, provides stand-by power for the company's hydroelectric plant.

# NO POWER BLACKOUTS HERE!

On August 2, 1951, a "Caterpillar" D397 Electric Set was approved by R.E.A. for use by the Quinault Light Co., Quinault, Washington, as stand-by power for its hydroelectric plant. Just ten working days later, this unit was ready for operation — and what a break its quick installation was for three villages. The day before its completion, lack of water had forced the hydro-plant's shut down. The D397 took over and ran until the water shortage ended — some 662 hours later!

Communities using "Cat" Diesel Electric Sets report that they're invaluable as a power source. Ranging in sizes up to 315 KW, they're quickly, easily installed. Their maintenance and operating costs are low. And they're trigger-quick to spring into action. Multiple units offer as much power as you need — power that's flexible, matching the load without waste. As for dependability — you can take that for granted — they're "Caterpillar" designed and built. For full *facts* about these units, see your nearby "Caterpillar" Dealer!

CATERPILLAR, PEORIA, ILLINOIS

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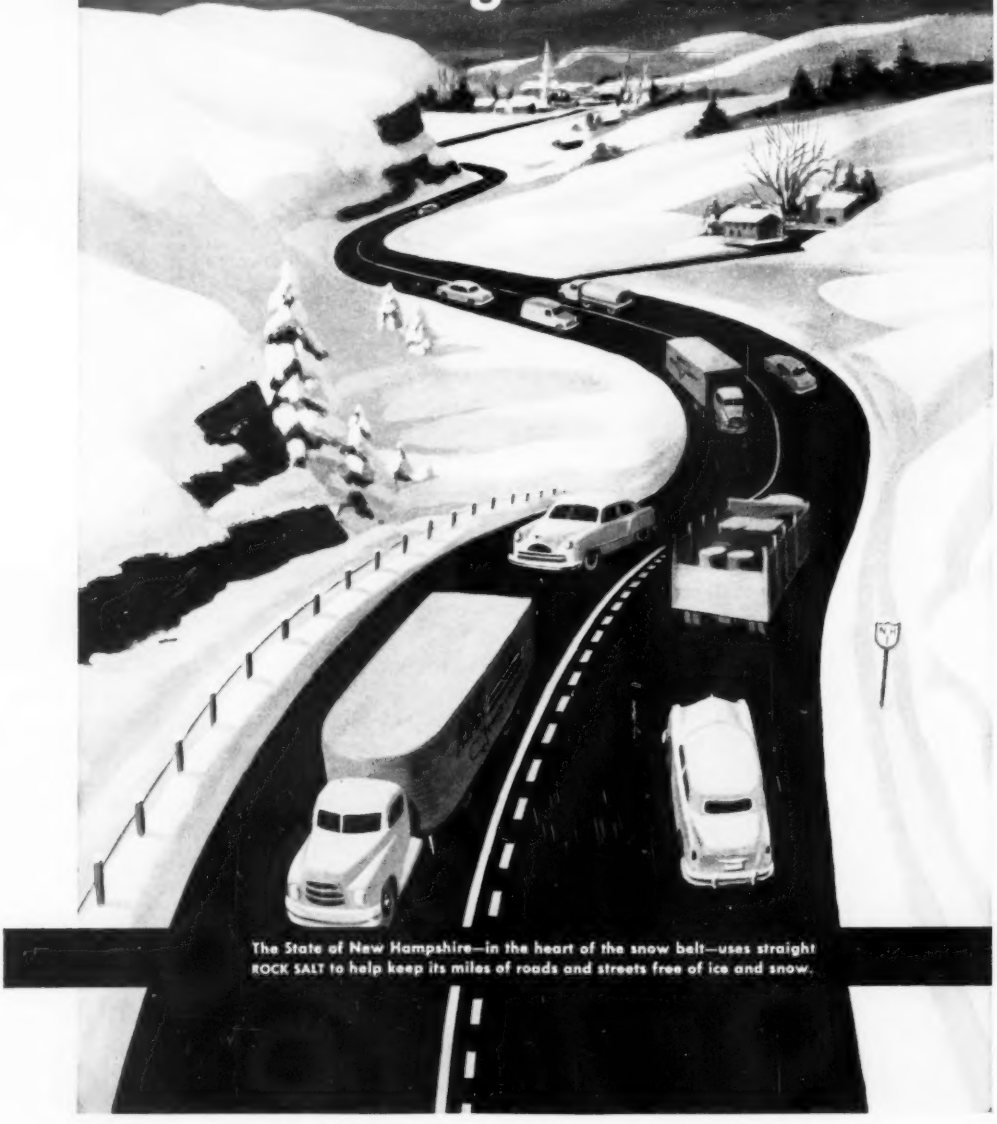
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

# NEW HAMPSHIRE
## Keeps Winter Traffic Moving with Straight ROCK SALT



The State of New Hampshire—in the heart of the snow belt—uses straight ROCK SALT to help keep its miles of roads and streets free of ice and snow.

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

# How You Can Clear Ice and Snow

## *IN 1/10th THE TIME- AT HALF THE COST!*

**SPEED**

One truck of STERLING *Auger-Action* ROCK SALT will cover 10-15 miles before reloading. One truck with abrasives will cover only 1½ miles before reloading. THUS SALT IS APPLIED IN 1/10th THE TIME OF ABRASIVES.

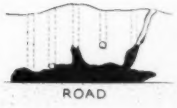
**ECONOMY**

Because STERLING *Auger-Action* ROCK SALT is easier to store and handle—because it goes so much further, in much less time—the total cost per mile of using straight rock salt is approximately *half* that of old-fashioned abrasive-chemical combinations.

## HOW STERLING *Auger-Action* ROCK SALT WORKS

STERLING *Auger-Action* ROCK SALT can be used in any mechanical spreader. Requires no special treatment.

Each STERLING *Auger-Action* ROCK SALT crystal bores a hole its own size.




Salt crystal reaches pavement, becomes brine. Brine BREAKS THE BOND between road surface and ice or compacted snow.

Broken ice can be removed with one pass of plow or scraper. Heavy traffic spots clear themselves with passage of vehicles.

**Comes in carloads, bulk, or 100-lb. bags.**
***ORDER NOW!***

# STERLING
## *Auger-Action*
# ROCK SALT

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**International Salt Company, Inc., Scranton, Pa.**

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**International Salt Co.**
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Gentlemen:

Please have your representative call to give me additional information—without obligation—on how to keep roads clear of ice and snow with straight ROCK SALT.

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*TITLE*_____

*ADDRESS*_____

*CITY*_____ *ZONE*____ *STATE*_____

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DRY!
SAFE!
CLEAN!
NO
IRVING
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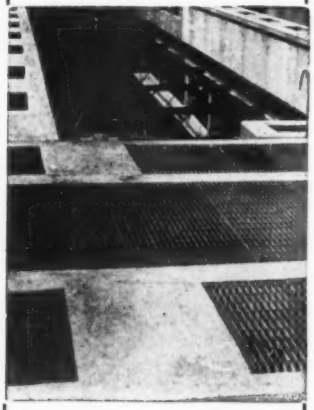
WALKWAYS and
STAIR TREADS



IRVING GRATING

Provides the perfect Dry, Clean, Safe flooring for Sewerage disposal Plants. Gratings of Aluminum, Steel and other alloys offer a minimum of Maintenance Cost.

Catalog Mailed on Request.

IRVING SUBWAY GRATING CO., INC.
ESTABLISHED 1902

OFFICE and PLANTS at
5053 27th St., Long Island City 1, N. Y.
1853 10th St., Oakland 20, California

# UP FRONT FOR ADEQUATE ROADS

BY
LEO J. RITTER, JR.

**Sufficiency Ratings:** One of the hottest things in the field of highway planning in recent years is the sufficiency rating system. A sufficiency rating is a numerical value which may be applied to a given section of road or street after an engineering evaluation of its structural condition, safety and ability to give service. A road perfectly suited to the demands that are made upon it would have a sufficiency rating of 100; if deficiencies exist when judged by modern standards, the rating will be less. A grossly inadequate section might have a rating of 15 or 20, or even less. The system, which is the brainchild of Karl Moscowitz of the U. S. Bureau of Public Roads, is being widely used to determine priority of improvement and to help sell highway programs to legislative bodies. The ratings are easily shown in chart form and have proved to be a powerful tool for mobilizing public support for planned highway improvements.

**Foreign Aid:** Want to hear about a real self-help program using American tax payers' money in a foreign land? Then look at the highway program that is being undertaken in the Philippines under the Mutual Security Administration.

Tentative plans there call for the expenditure of about 10 million dollars over a five-year period to aid in the development of a highway system on Mindanao, that vast and fertile island upon which so much of the future of this American-sponsored democracy in the Orient depends. Roughly six million dollars have already been earmarked, not for the construction of roads, but for the purchase of construction and maintenance equipment. The basic contribution of the Philippine government to the program is the pledge of a sufficient expenditure of counterpart (peso) funds to utilize efficiently the equipment purchased with U. S. dollars. It is believed that the planned expenditure of about 12 million pesos (6 million dollars) per year will be required to satisfy this condition. Thus, we are providing the Filipinos with the basic tools needed for them to help themselves. The U. S. Bureau of Public Roads handles the program for M. S. A. under the able leadership of A. C. Taylor, Division Engineer at Manila.

**A Good Idea:** The California Division of Highways has recently approved a new method of casting raised traffic bars (used for center striping, channelization of intersections, etc.) in place by extruding a mixture of white sand, white cement and an additive from a special machine. Principal advantages claimed for the method are speed of installation, as compared with conventional methods using plant mix bars, and low maintenance costs. The new bars do not require painting after installation. Development work was done under the supervision of Blair Geddes, Traffic Engineer, District III, Marysville.

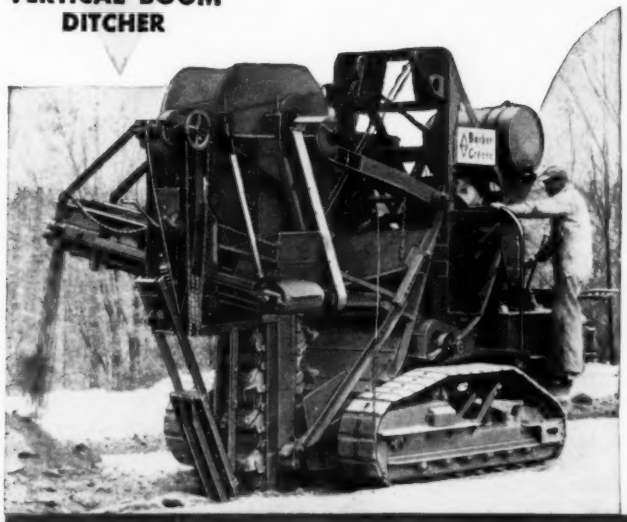
**The Alabama Plan:** An unusual and successful approach to the problem of encouraging civil engineering students to prepare themselves for careers in the highway industry is being carried out in Alabama under the general sponsorship of the Alabama Road Builders Association. This program has four distinct phases, perhaps the most important of which is the summer employment program by which qualified civil engineering students at the University of Alabama and at Auburn are provided with summer employment during college vacations by sponsoring firms and agencies. The plan is arranged so that a student may spend one summer each in the employ of a government agency, like the State Highway Department or a city or county engineering

(Please turn to page 92)

# BARBER-GREENE HEAVY DUTY DITCHER

## MODEL 44-C VERTICAL BOOM DITCHER

## *for lowest cost per foot of trench in all weather*



### *SAVE ON JOBS LIKE THESE:*

- Highway Widening
- Sewer, Water and Gas Distribution
- Pipe Line Construction
- Airport Drainage
- Uncovering Joints
- Placing Conduit Tile
- Building Foundations
- Farm Tiling
- Grave Digging

***DIGS CLEAN...*** leaves vertical walls . . . square cuts . . . eliminates most expensive handwork.

***MILLING ACTION...*** closely spaced buckets pare small increments as a milling machine cuts metal.

***OVERLOAD RELEASE...*** slips when overload occurs . . . automatically re-sets itself . . . no down time for replacing shear bolts, etc.

*Only* Barber-Greene offers so many proved ditcher advantages to save time and money on all trenching operations. For instance, the Vertical Boom means a compact, easily maneuvered machine: digs straight down, right up to walks, foundations, underground pipes, etc. . . . digs *all* the ditch . . . no expensive handwork required. The Vertical Boom stays *down* — the harder the digging, the harder the buckets hold it down. Cuts trench to 8'-3" depth, 24" wide.

Self-cleaning "kick-out" buckets operate in a vertical plane . . . produce the famous B-G milling action that cuts through coral, frozen ground, caliche and other formations that completely stop other ditchers.

Another time- and money-saving feature is the exclusive B-G overload release that slips on overload and automatically resets itself until the obstruction is removed or the operator stops machine—and then it re-sets itself for continued operation, protecting machine, hidden mains, cables, etc.

Plan to put the advantages of the B-G Model 44-C to work for you.

**Barber-Greene** BG

*Aurora, Illinois, U. S. A.*

Now's the time to mail this month's Readers' Service card.

# FREE

**to WATER WORKS and SEWAGE MEN**

## HOW TO CONTROL ALGAE

"The Use of Copper Sulphate in Control of Microscopic Organisms" by Dr. Frank E. Hale (former Director of Laboratories, Dept. of Water Supply, City of New York) is an authoritative work concerning the control of micro-organisms and elimination of tastes and odors. Describes in detail methods of controlling various forms of microscopic life commonly encountered in water supply systems. Contains descriptive material, plus 48 photo-micrograph studies of organisms discussed.

## ROOT AND FUNGUS CONTROL

"Copper Sulphate for Root and Fungus Control in Sanitary Sewers and Storm Drains," by John W. Hood, contains information published for the first time. This material includes actual methods for control and operating procedure. Here's the book that is a "must" for all sewage men.

**GET EITHER OR BOTH OF THESE BOOKLETS ABSOLUTELY FREE—**
These two valuable booklets, so important to all water works and sewage men, are yours *without obligation.* Mail coupon below!

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☐ "Control of Microscopic Organisms"
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PW-12


# People, Ideas and Places

## BY "DOC" SYMONS

**Here's That Man Again** — to you, from now on, H.T.M.A.—And may I say that it's "right nice" to be writing this column for *Public Works Magazine.*

I hope that through this monthly "letter" I shall find many new friends and that both new—and old—friends will find in it something helpful, interesting—or amusing.

★ ★ ★

Under the title "People, Ideas & Places", I shall roam at will here and there, recounting stories about your friends and mine, about news, ideas, places, happenings and—things. In short, I shall try only to "Be Myself" and I sincerely hope that I may count on my readers to contribute items of interest to this column.

★ ★ ★

Last month, for the benefit of new readers, the folks at *Public Works* ("Bill" Hardenbergh, Croxton Morris, and Art Akers) told you something about me. What they didn't tell you is that I'm a "Joiner". In addition to all the professional organizations to which I belong, I also am a member of the following:

Society of Council Bluffers
Wisconsin AWWA Beanie Club
Sludge Shovelers Society
Wearers of the Golden Mitten of Indiana
W.P.A. of Illinois
Convention Circuit Riders
1313 Club
FOAWHJ&PW
25 Year Non-Superintendent's Club

From time to time, you may read here, something about various members of these organizations.

★ ★ ★

**Point With Pride**—The 25th Anniversary Meeting of the Federation of Sew. & Ind. Wastes Ass'ns., held at the Statler Hotel last October, really broke the attendance record wide open, what with 209 ladies (previous high, 202 at Toronto in '44) and 943 men (previous high, 769 at Washington in '50) for a total of 1152 (previous high, 904 also at Washington). AND—all but half a dozen or so registered and paid registration fees, before Wednesday evening.

I was proud to have had some part in the general arrangements, but the highlight of the meeting was the 25th Annual Luncheon, which was Secy. "Pete" Wisely's idea. Charlie Emerson reviewed the past 25 years of the Federation, the incomparable Abel Wolman previewed the next 25 years and "Bill" Orchard toasted the Federation, Past, Present, and Future.

The toast was drunk in champagne by the head tablers, with the champagne provided by Secretary Wisely, who had won this elixir of the grape from one Doc Symons on a bet made four years ago—but that's a story in itself.

★ ★ ★

**Luminous Quote** — "There are occasions when an administrator should use his head." (Abel Wolman at the FSIWA Luncheon, Oct. 7, '52).

★ ★ ★

**As I Heard It** — Among the entertainment features provided for the ladies at the Federation Meeting (and the Ladies' Committee did a whale of a job), were radio and television broadcasts. One of the ladies who attended a "give-away" show was Mrs. Dwight Bender, wife of the Ass't. Sup't. of Sew. Treat., Indianapolis, Ind.

Mrs. B. was called to the stage because she had on a badge. The M.C. asked what FSIWA meant and when told, "Federation of Sewage and Industrial Wastes Assn's.", he made much ado over the fact that he'd never heard of it. Then he called on another lady wearing a badge and she turned out to be conventioning with the Cemetery Secretaries Assn. Whereupon, the M.C. asked, "Which one of you digs deeper?"—When the two ladies

*(Please turn to page 98)*

INFILCO
since 1894

Accelator®
SAVES VALUABLE SPACE
REDUCES INSTALLED COSTS

**MODERN WATER TREATMENT PLANTS,** with Accelators, are saving up to 80% of the space required by "old-style" plants. Primary savings are accomplished by combining mixing, coagulation and clarification in a single unit . . . far less space for the same or extra capacity. This basic design achievement also reduces the installed cost of municipal and industrial water treatment plants whether they require clarification, softening, or combined clarification and softening.

**AN EXCLUSIVE TIME-TESTED PRINCIPLE —** dynamic separation — increases solids separation rates so that *better* results are obtained in *smaller* basins

*(continue to next page)*

*(continued from preceding page)*

than can safely be used with equipment of any other design. Accelator operations actually "squeeze" clarified water out of a *downward* moving pool of slurry! Simply stated, Accelator advantages add up to most effective water treatment in *less space at lower cost*. Over 1300 installations attest to these benefits. Write for complete information on this modern process for water treatment. Ask for Bulletin 1825-B.

**INFILCO INC.** *Tucson, Arizona*

*Field Engineering Offices in 26 Principal Cities • Plants in Chicago & Joliet, Illinois*

INFILCO
*since 1894*

**Infilco builds a complete line of equipment for municipal and industrial water treatment plants making possible UNIFIED RESPONSIBILITY FOR PERFORMANCE — BACKED BY OVER 50 YEARS' EXPERIENCE.**

Accelator*
Acid Feeders
Activated Carbon Purifiers
Aerating Nozzles
Aerators
Aero-Accelator
Aero-Spray Nozzles
Alkalinity Reduction Plants
Anexer*
Automatic Controls
Automatic Proportioners
Boiler Feed Treatment Plants
C.-A.-P. Systems
Catexer*
Chemical Feeders
Chemical Proportioners
Chemical Test Apparatus
Clarifiers
Coagulant Feeders
Coagulators
Color Removal Plants
Crystalite* Water Softeners
Cyclator*
Dechlorinating Plants
Deionizers
Depth Gauges
Disk Filters
Filter Gauges
Filter Operating Tables
Filter Plant Equipment
Filter Strainers and Nozzles
Filter Underdrain Systems
Fluorex* Purifiers
Gauges, Indicating & Recording
Gravity Filters
Hot-Flow* Water Softeners
Hot Process Accelator
Hydraulic Controls
Hydraulic Switches
Hydrodarco Purifiers
Industrial Waste Treating Plants
Ion Exchangers
Iron Removal Plants
Lime Slakers & Feeders
Lime-Soda Water Softeners
Liquid Level Controllers
Loss of Head Gauges
Manometers
Mixing Basin Equipment
MultiCone Aerators
Odor Removal Plants
Phosphate Feeders
Phosphate Softeners
Pressure Filters
Rate of Flow Controllers
Rate of Flow Gauges
Recarbonators
Sampling Tables
Sand Filters
Sediflotor
Steam Purifiers
Stellar* Filters
Sterilizing Equipment
Swimming Pool Systems
Taste Removal Plants
Vapor Purifiers
Vorti-Floc*
Vorti-Mix*
Wagner Underdrains
Wash Water Controllers
Waste Acid Neutralization Plants
Waste Water Treating Plants
Water Filters for Every Need
Water Softeners of Every Type
White Water Treating Plants
Zeolite Water Softeners

*Reg. U.S. Pat. Off.

## PROVED SPACE-SAVINGS!

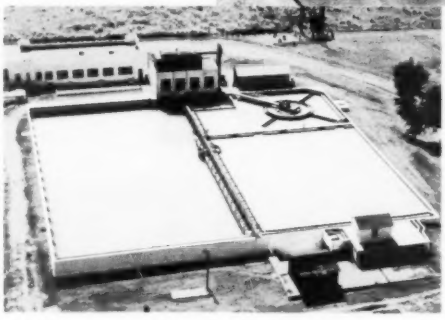
Here's how Accelators save space in both municipal and industrial water treatment installations.

**VERSATILE DESIGN**

*See how this Accelator installation, 48 feet square, was designed to fit economically into a limited congested plant area to clarify and soften 6 M.G.D. of Monongahela River water for industrial use.*

**ANOTHER EXAMPLE — INDUSTRIAL TREATMENT PLANT**

*This paper mill uses clarified river water for process work. Accelators (on extreme left) treat 22 M.G.D. and occupy about ¼ of the space needed by the plant on the right having the same capacity.*

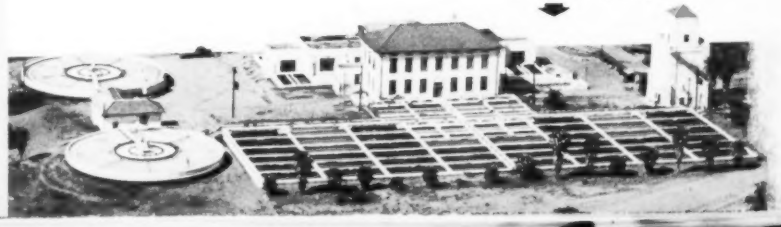


**ALMOST 10 TO 1 ON AREA COMPARISON**

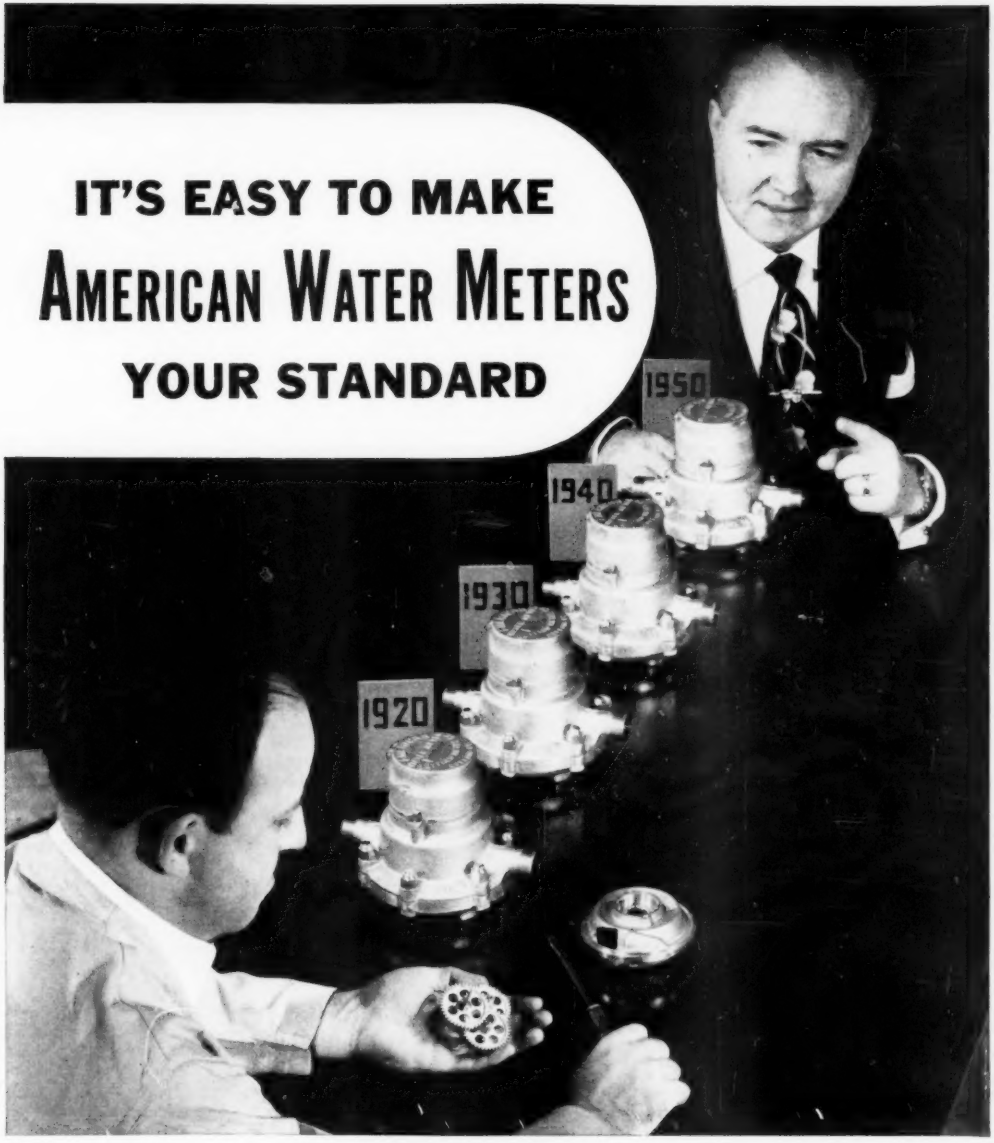
*This Accelator, 70 feet square, in upper right of photo, installed in much less space, treats 12 M.G.D. "Old-style" basin treated but 9 M.G.D. and required 205 sq. ft. area.*

**BIG CAPACITY, SMALL SPACE**

*"Old-style" plant requires 38,900 sq. ft. and treats 21 M.G.D. Accelators treat 30 M.G.D.—almost ½ greater capacity — in about ¼ the space.*



# IT'S EASY TO MAKE
# AMERICAN WATER METERS
## YOUR STANDARD




• These unit assemblies or any parts of them are interchangeable with parts in these older meters. Advances in metallurgy and design have been made to improve function and lengthen life without changing dimensions.

City departments save cost by standardizing on American Meters. There are savings in stock inventory, repair time and parts cost. Meters are kept in service earning dollars — with a minimum of shop effort.

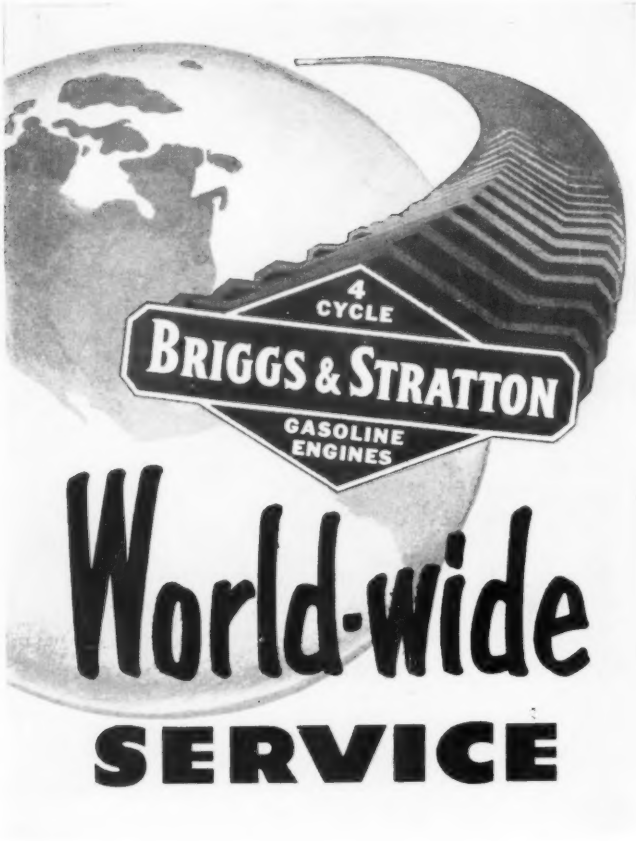
American Meters are designed for cities that figure costs closely, a basic long term policy of Buffalo Meter Co.

*Ask for complete data.*

**BUFFALO METER CO.**

**2920 MAIN STREET, BUFFALO 14, NEW YORK**

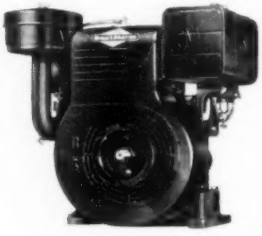
It's a fact... our handy Readers' Service card is the way to get new catalogs.




**THE GREATEST SERVICE ORGANIZATION OF ITS KIND IN THE WORLD . . .**

Near you there is a Briggs & Stratton service organization — factory trained and supervised — ready to tune up, repair, or even rebuild your Briggs & Stratton engines with *original* Briggs & Stratton parts.

If your Briggs & Stratton engines are not busy during these winter months, now is the ideal time to have them serviced — to insure continued peak performance for busy periods ahead.

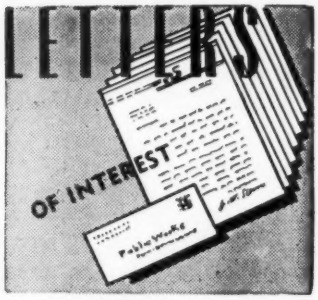


Only Briggs & Stratton maintains such complete world-wide authorized service facilities — a big "plus" that you get only when you specify Briggs & Stratton engines on the gasoline powered equipment you buy.

Briggs & Stratton Corporation, Milwaukee 1, Wisconsin, U. S. A.

**In the automotive field Briggs & Stratton is the recognized leader and world's largest producer of locks, keys and related equipment.**

Need more facts about advertised products? Mail your Readers' Service card now.




## THE COST OF LAYING PIPE

To Mr. George Van Dorp: I have noted with interest an item on page 114 of the October issue of Public Works Magazine indicating that your average cost of laying 6-inch water lines in Toledo during 1950 and 1951 was $4.91 per foot. We find this to be interesting because of the difference in cost between your part of the country and this part. Was this work done by contract or by city forces? Our contract work for 6-inch water lines averages $2.50 per foot, including engineering, which costs 20 cents a foot. This does not consider hard rock excavation nor cutting and replacement of pavements. It is exclusive of fire hydrants which, in Dallas, are set with normal spacings of 800 to 900 ft.

We are particularly interested in your wage scales and whether you lay this pipe with plumbers or pipe layers; also, the depth of cover, which is about 42 ins. in this section.

*R. M. Dixon,*
Managing Director,
Municipal Contractors Ass'n.,
Dallas, Texas.

Reply by Mr. Van Dorp: The following information is submitted concerning the construction of 6-inch water service mains in Toledo, O.: The cost per foot of laying 6-inch mains in Toledo includes tapping or connecting into an existing main; engineering; laying of the main; back-filling; pavement or ground surface restoration; testing; sterilizing; valves; valve chambers; fire hydrants; hydrant control valves and, of course, the cost of the pipe itself. Division of Water personnel designs, installs, tests and sterilizes all 6-inch and 8-inch mains within the city limits.

*Engineering.*—Division of Water

*the New*

# OLIVER "OC-18"

***the Operator's Dream come true!***

Here's a tractor that has been designed specifically to make life as easy as possible for the operator. Just check this list of "easy operating" features —it puts the "OC-18" 'way out in front as the tractor that gets more done . . . faster . . . every day.

**1. Over-Center Clutch.** The clutch bar runs across the full width of the dashboard. No need here for the operator to hunt for a single lever . . . to take his eyes off the work.

**2. Air Steering is *Standard Equipment*** You can steer the "OC-18" with just two fingers of one hand.

**3. Push Button Electric Starting.** The husky starter of the "OC-18" gets the engine going . . . quick.

**4. Cold Weather Starting Aid** . . . standard equipment on the Oliver "OC-18" for fast, easy starting in extremely low temperatures.

**5. Center-Positioned Gear Shift Lever** . . . is located right where it's easiest to reach.

**6. Ample Leg Room** . . . no cramped legs after a hard day's work with the "OC-18".

**7. Convenient Foot Parking Brakes** are standard equipment on the "OC-18".

**8. Comfortable, Two-Man Seat** . . . plenty of room for two men in this upholstered seat.

**9. Easy-Acting Friction Throttle** is located at the right arm rest of the seat in the most convenient position for the operator.

**You get plus performance too! A full 126 drawbar horsepower . . . greater stability . . . more track on the ground. Just note the photograph. See how the track hugs the ground almost its entire length. It means real pulling power . . . greater stability and better balance for dozing.**

**Try out this great new tractor yourself. Ask your Oliver Industrial Distributor to arrange a demonstration. When you've seen the "OC-18", you'll never be satisfied with any other big tractor.**

## THE OLIVER CORPORATION

**400 West Madison Street, Chicago 6, Illinois**

***A complete line of industrial wheel and crawler tractors***

The OLIVER Corporation, Industrial Division
400 W. Madison Street
Chicago 6, Illinois

Gentlemen:

Please send me literature on the Model "OC-18" Industrial Crawler Tractor.

Name .....

Company ..... Dept .....

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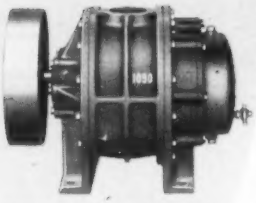
Get full details of this month's new products . . . mail your Readers' Service card today.

# For 10 CFM or 100,000 CFM ...compare blower values

ROTARY



Typical low-capacity R-C Rotary Positive Blower. Sizes range from 5 cfm to 50,000 cfm, permitting selection closely matched to needs.

- ☐ Choice of Rotary or Centrifugal
- ☐ Capacity matched to the job
- ☐ Easy accessibility
- ☐ Ruggedness
- ☐ Ease of installation
- ☐ Ability to handle overloads
- ☐ Long-time durability
- ☐ Freedom from breakdowns
- ☐ Low maintenance costs
- ☐ Engineering assistance
- ☐ Proved reputation of maker
- ☐ Customer satisfaction

No need to take chances when buying blowers, exhausters or gas pumps. Just put this "detector test" to work on your specific problem and you'll arrive at the most satisfactory answer.

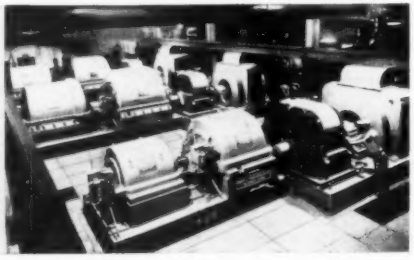
For instance, if you're debating between Rotary Positives and Centrifugals, remember that only Roots-Connersville builds both—the exclusive *dual-ability line* that permits unbiased recommendations. Their wide range of capacities supplies sizes and types that are quite likely to be most closely matched to your needs.

For economy of operation, reliability and low maintenance, we refer you to a list of users that dates back almost a century. If you'll rate your possible choices on a performance basis, you'll usually find R-C equipment "tops" on the list.

To help you make the most profitable, practical decision, our experience is at your service.

ROOTS-CONNERSVILLE BLOWER CORPORATION
525 Poplar Avenue, Connersville, Indiana

CENTRIFUGAL



Six R-C Multi-Stage Centrifugal Blowers equipped with automatic regulators to provide extremely wide range of operation at various pressures and capacities.

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.

Now's the time to mail this month's Readers' Service card.


engineering personnel prepares plans and estimates for the proposed lines, after approval by the Council. They set the necessary line and grade stakes, give periodic supervision, test and sterilize the mains and prepare record drawings.

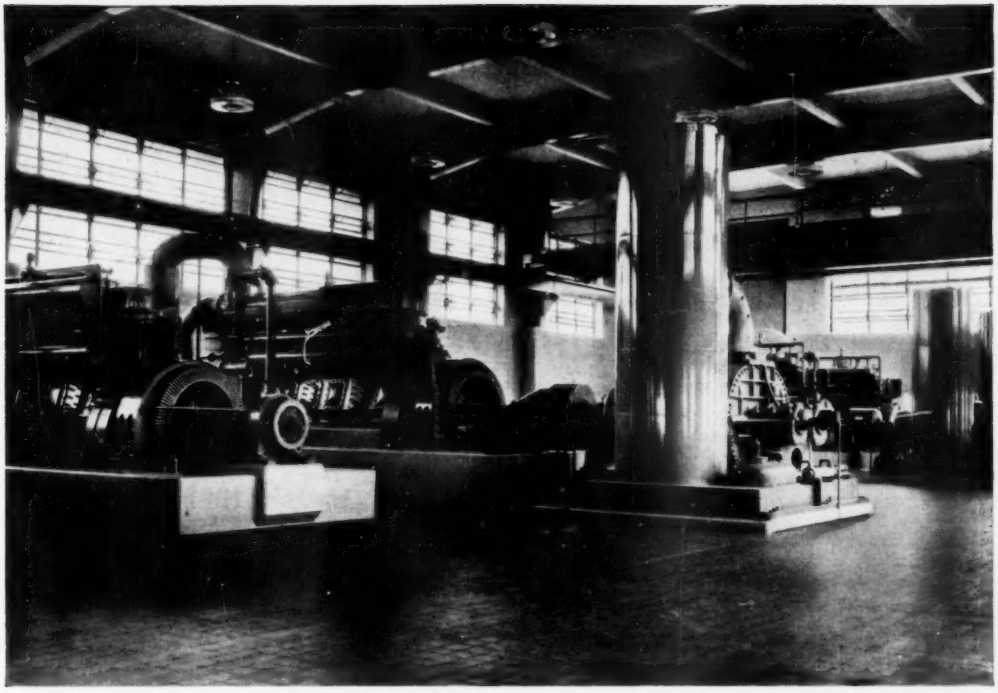
*Construction.*—Construction Department personnel set up the job schedule, make all necessary taps into existing mains and construct the main under street crossings when these occur at the ends of new mains so as to give the ditching machine an unobstructed run. *Hauling* of pipe is by one dump truck, with 12-ft. bed, with an actual cost of $4.50 per hour for truck and driver. For *installation* of 6-inch mechanical joint cast iron pipe, the crew consists of 1 foreman at $2.11 per hour; 1 truck driver at $1.73 per hour; 2 service or repairmen or mechanics, to make up mechanical joints, pour lead joints and set hydrants, at $1.73 per hour; 2 laborers to load and unload pipe, lower it into the trench and do miscellaneous work, at $1.67 per hour. *Ditching* is done by a small trenching machine rented at a cost of 50 cents per foot of trench, complete with operator, gasoline and oil. *Backfilling* is done by a small city-owned maintainer which is charged for at $6.00 per hour, complete with operator, gasoline and oil. If a truck crane is needed, a city-owned crane is used at a cost of $12.00 per hour, including operator, gasoline and oil (operator at $2.05 and machine at $9.95 per hour). Valve chambers on main line valves are constructed of concrete brick; the bricklayer is paid $2.31 and the helper $1.67 per hour.

*Tapping.*—The Tapping Department makes necessary taps for sterilizing the line and makes the appropriate charge against the main.

*Pavement Restoration.*—Most lines are installed between the sidewalk and the curb. Where necessary, the Division of Water requisitions the Street Department to resurface at a cost of $12.00 per sq. yd. Division of Water crews place temporary restoration.

The above prices are based on our 1952 wage rates and can be modified back to the respective year on the following basis: 1950 wages are basic; 1951 wages are basic plus $300 per year living cost; 1952 wages are basic plus $525 per year living cost. A working year is 1920 hours.

*George J. Van Dorp,*
Water Commissioner,
Toledo, Ohio.



DRIVING BLOWERS AND ELECTRIC GENERATORS at Nassau County Sewage Treatment Works at Bay Park, East Rockaway, N. Y., are 5 Worthington super-charged dual fuel engines utilizing sewage sludge gas as a fuel. Engine in center is connected in a combination drive to a 500-kw generator and a 16,112-cfm blower. Consulting engineers: Greeley and Hansen, Chicago, Ill.

# How Nassau County Sewage Treatment Works uses sewage sludge gas for economical operation

The newest and the best!

That's everyone's reaction on entering the modern and attractive looking Main Building of the Nassau County Sewage Treatment Works just outside of New York City. It's a first impression that is confirmed by further investigation, for the plant's up-to-the-minute design makes it one of the most efficient in operation anywhere in the country.

As you enter this immaculate, well-planned building, you will note the modern design and rugged construction of the Worthington supercharged dual fuel engines.

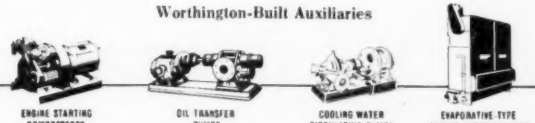
This multi-engine station offers excellent power flexibility to meet the varying load demand since there are two generating units, one combination generator-blower unit and two blower units.

Fuel costs will be at a minimum as these engines will burn sewage sludge gas—a by-product of the sewage treatment process.

If you are interested in obtaining maximum horsepower for the lowest possible cost, investigate these Worthington dual fuel engines. Write for Bulletin S-500-B31C to Worthington Corporation, Engine Division, Buffalo, New York.

E.2.12

**Worthington-Built Auxiliaries**

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Howard Price and Company
Huntington, W. Va.

"This grader is on U.S. Route 35, where we are engaged in a project involving 2.05 miles of grading, draining and ditching, as well as paving the highway in North Charleston between Two Mile Creek and Tyler Creek.

"This is the first Austin-Western grader to be used in this family of contractors, and I have no hesitancy in saying that the 99-H is the most versatile grader I have ever seen, as well as the most maneuverable. It will do jobs that other graders will not do, and, when the going is really tough, it will operate under conditions that other graders would not attempt. Just recently, after several days of heavy rain, the 99-H was doing its chores on schedule. Two other graders of well-known makes were compelled to stand by until the terrain was favorable to the extent that they could be put to work. This adds up to more hours operation every week for the 99-H.

"Aside from the standpoint of the 99-H's ability to take tough going in stride, it is also the easiest grader to operate that I have ever owned. The operators like it, which means we get more efficiency from them."

HOWARD PRICE AND COMPANY
Howard Price
President

**Thank you, Mr. Price, for putting into words—what so many other contractors have learned—that Austin-Western's *exclusive* combination of ALL-WHEEL DRIVE and ALL-WHEEL STEER means top grade performance by America's top grader.**

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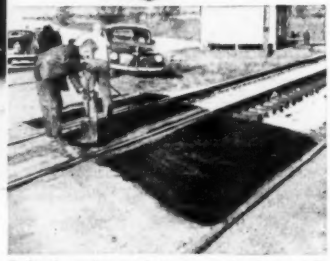

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## LEADERS IN PUBLIC WORKS

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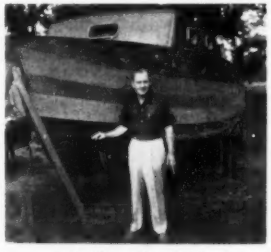
**Samuel Parish Turnbull,** State Highway Engineer of Florida, began his highway engineering career 27 years ago, at the age of 20, as a rodman. Except for a year with the Louisiana Highway Department and 39 months in the Army's Corps of Engineers, he has been with the Florida Highway Department just about all of his professional career. In the Army, which he left as a Major in 1945, he served in the European Theater, and won the bronze star. In Florida, he served as project engineer, division location engineer, state drainage engineer, assistant and then division engineer before becoming State Highway Engineer some four years ago.

He is married to a girl from Louisiana. The Turnbulls, with their five children, live in Tallahassee. Outside of working hours, he is a boating



**Building his boat**

and fishing enthusiast and he is now completing, in the back yard of his home, a 22.5-ft. twin screw cabin cruiser and from the pictures we have it looks like it would, in due time, become a mighty nice job.

**IN HAMILTON, ONTARIO** —The problem was to install seven miles of 48" line, fast, to meet the terrific demands of the city's rapidly expanding industrial and residential areas. A $1,900,000 job, including the filtration plant. With confidence, Hamilton engineers specified a Dresser-Coupled steel line.

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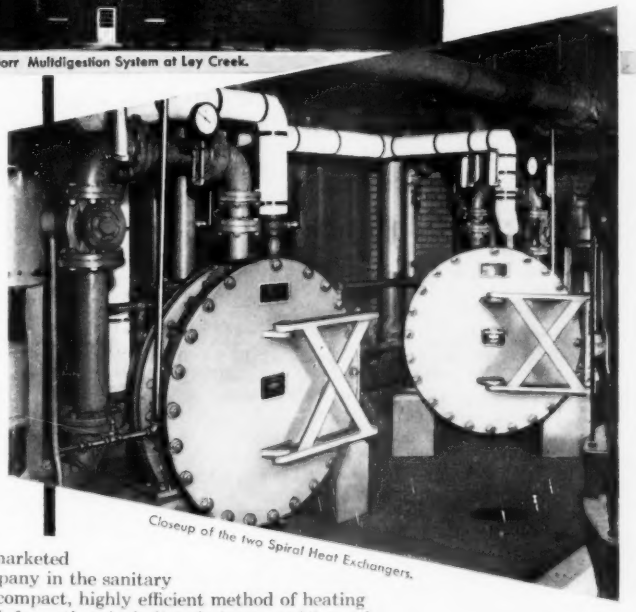
In late 1950, two Spiral Heat Exchangers, each with a rated capacity of 200,000 BTU/hr., were installed at the Ley Creek Sewage Treatment Plant, Syracuse, N. Y.

Reports direct from the Superintendent of the plant conclusively state that the units have operated successfully since initial start-up in January 1951 . . . that there has been no plugging in the Exchangers . . . and that they have done a very good job of heating the digesters, as shown by the data below.

General View of the Dorr Multidigestion System at Ley Creek.

At the Ley Creek Sewage Treatment Plant, Syracuse, N. Y., separate sludge digestion is carried out in a Dorr Multdigestion System with two Primaries and one Secondary. Each Primary is heated by a Spiral Heat Exchanger utilizing cooling water from a gas engine as the heat source. Operating data — for a twelve months period — is summarized below:

Number of units — 2
Rated capacity/unit-200,000 BTU/hr.
Avg. heat transfer — Exchanger #1 — 223,000 BTU/hr.
Avg. heat transfer — Exchanger #2 — 261,000 BTU/hr.
Maximum transfer recorded — 485,000 BTU/hr.
Minimum transfer recorded — 91,000 BTU/hr.



Closeup of the two Spiral Heat Exchangers.

The Spiral Heat Exchanger, marketed exclusively by The Dorr Company in the sanitary engineering field, is a simple, compact, highly efficient method of heating sewage digesters. For further information, including design capacities and sample specifications, write for Bulletin No. 6281, The Dorr Company, Stamford, Conn.

Multdigestion is a trademark of The Dorr Company, Reg. U. S. Pat. Off.

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**The engineering information in these helpful catalogs will aid you in Engineering and Public Works programs. Just circle numbers you want on the coupon or write the manufacturer direct and mention PUBLIC WORKS.**

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### Year End Favor

**203.** A handy plastic pocket calendar for 1953 with 3-inch rules marked off in 1/10th and 1/10th inches, and tables of sheet steel gages, circular areas, corrugated metal pipe weights and various section moduli may be obtained from Armco Drainage & Metal Products Inc., Middletown, Ohio, or by using the coupon.

### Convenient Drain Tile Specifications

**204.** A new bulletin, outlining specifications for the proper installation of drain tile, has been prepared by the Bowerston Shale Co., Bowerston, Ohio. This bulletin covers ASTM and Federal standards and includes information on tile spacing, depth and location for various drainage projects. Check the coupon for your copy.

### Have You Heard About Bionetics For Sewage Treatment?

**279.** Bionetics, a dry, stable powder of groups of living organisms preserved with enzyme systems is said to improve and accelerate the biological processes performed by sewage treatment plants. A new four-page folder which describes the nature and function of Bionetics, with details of the several types available, is offered by Reliance Chemicals Corp., Box 6724, Houston 5, Texas. Check the coupon now to learn about this new product.

### Details on Motor Grader Construction and Use

**312.** In a handsome new catalog, profusely illustrated with diagrams and photographs of unusually fine quality, the Galion Iron Works and Mfg. Co., Galion Ohio, has presented all details on the construction and operating features of their Model 118 motor grader. This impressive 28-page catalog, No. 375, is available without charge. Just check the coupon.

### Trencher Fits Municipal Needs

**315.** A new bulletin describing the Cleveland Model 95 trencher has been published by the Cleveland Trencher Co., Cleveland 17, Ohio. The Model 95, called "The standard machine for city and suburban work", is versatile, manueverable and economical for use on water lines, service lines, road widening and all utilities trenching. Get this 8-page illustrated bulletin by checking the coupon.

### Discussion of Sewage Chlorination

**316.** Sewage chlorination and factors in selecting chlorine gas feeders are discussed in Keep Sheet No. 15 issued by Builders-Providence, Inc., 356 Harris Ave., Providence 1, R. I. All factors related to sewage chlorination are covered in this valuable reference leaflet. Check the coupon for your copy.

### "Governmental Graders"—A Booklet For Those Who Build and Maintain Roads

**310.** "Governmental Graders," a booklet published especially for the 18,000 governmental agencies with jurisdiction over local-rural roads tells how the three sizes of "Cat" motor graders do the job on road building and maintenance programs. Of particular interest is a table of repair costs compiled from public records. Get your copy from the Caterpillar Tractor Co., Peoria 8, Ill., or by checking the coupon.

### Improved Waste Receptacles Save Maintenance Work

**311.** Post-mounted waste receptacles that are easy to install and to maintain are described in a folder issued by the Sydell Mfg. Co., 429 So. Tryon St., Charlotte, N. C. The design of these containers makes them easy to use for pedestrian litter but discourages improper use by business establishments. Get full details by checking the coupon.

### Helpful Booklet Discusses Air-Entrained Concrete

**313.** The principal uses of air-entrained concrete, the functions and effects of entrained air on plastic and hardened concrete and improvements resulting from the use of air-entraining agents are discussed in an interesting new booklet published by the A. C. Horn Co., Inc., 10th St. and 44th Ave., Long Island City 1, N. Y., manufacturers of "Ayr-trap". Check the coupon for this interesting booklet.

### 10 Outstanding Features of Diesel and Dual Fuel Engines

**314.** Modern, efficient Diesel and dual fuel engines with the exclusive Hamilton rotary valve design are described in Bulletin 218A published by the Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio. A list of ten outstanding features of the Hamilton 21½ x 27½ Diesel is presented, and all construction features are clearly described and illustrated. Check coupon for a copy of their bulletin.

MORE LISTINGS ON PAGES 34 TO 50

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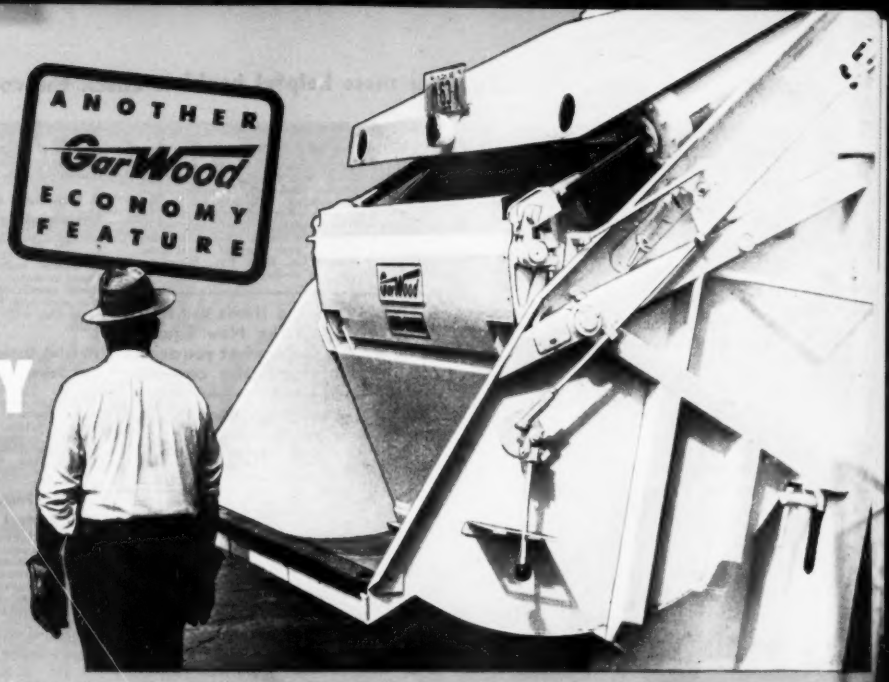


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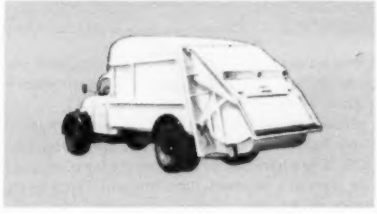
Five-second compaction is but one of the many cost-cutting features of Gar Wood Load-Packers. For faster, more efficient and more economical refuse collection in your community *get the Load-Packer story from your nearby Gar Wood Dealer* . . . or use the coupon below.



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### Fuel Cost Savings With Diesel Powered Tractors

**317.** Sheppard Diesels of Hanover, Pa., stresses the 75% fuel cost savings of Sheppard full Diesel power in their new booklet on industrial tractors. Illustrations show their SDI-3 working with Lull Shoveloader, Hopto digger and special purpose units. The bulletin is available by checking the coupon.

### Engineering Data on Guard Rail Design

**318.** Helpful information on guard rail design is offered in an 8-page bulletin "USF Barrier-Beam Guard Rail" published by Highway Products Div., United Steel Fabricators, Inc., Wooster, Ohio. Just check the coupon for your copy of this valuable booklet.

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## SEWERAGE AND WASTE TREATMENT

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### Valuable Booklet on Porous Diffuser Plates and Tubes

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**Over one hundred items are listed here and in the New Equipment section. Order what you need today. Just check the coupon.**

### How Cities Clean Sewer Lines From Street in One Operation

**25.** In a helpful 28-page handbook of sewer cleaning methods and equipment the makers of ON Champion sewer cleaners give full details of power and hand operated models. Also included are data on expansion buckets that take dirt from sewer to street in one operation, root cutters and other accessories. Get your copy by checking coupon. Champion Corp., 4752 Sheffield Ave., Hammond, Ind.

### Water Level Controls for Sewage and Water Plants

**31.** Dependable float-operated pump and motorized valve controls for single or multiple pump installations are described in bulletins issued by the Water Level Controls Div., Healy-Ruff Co., 719 Hampden Ave., St. Paul 4, Minn. All units feature splash proof construction, mercury tube switches.

### Design Data Offered On The Spiragester

**42.** The Spiragester, a unit which combines the Spiraflo Clarifier and a digestion compartment in a two-level arrangement to save space and reduce construction costs, is fully described in Bulletin 124 released by Lakeside Engineering Corp., 222 West Adams, Chicago, Ill. Design details, including capacities for 8' to 24' units are furnished together with typical plan and elevation. Check the coupon for this helpful bulletin.

### A Handbook of Sewer Cleaning Equipment and Methods

**46.** A new, fully illustrated 40-page booklet shows every sewer cleaning operation with "Flexible" tools. Includes data on the fast and easily operated new SewerRodeR and full engineers' specifications for power bucket machines. For your copy write Flexible Sewer Rod Equipment Co., 9059 Venice Blvd., Los Angeles 34, Calif.

### Helpful Design Data For Sewage Ejectors

**81.** The applications and advantages of pneumatic sewage ejectors are outlined in a new bulletin of the Blackburn Smith Mfg. Co., Inc., Hoboken, N. J. Included are piping diagrams for electrode and float switch controls plus dimensions and layouts for single and duplex systems. Get your copy by checking coupon.

### Get the Facts on The Contact Aeration Process

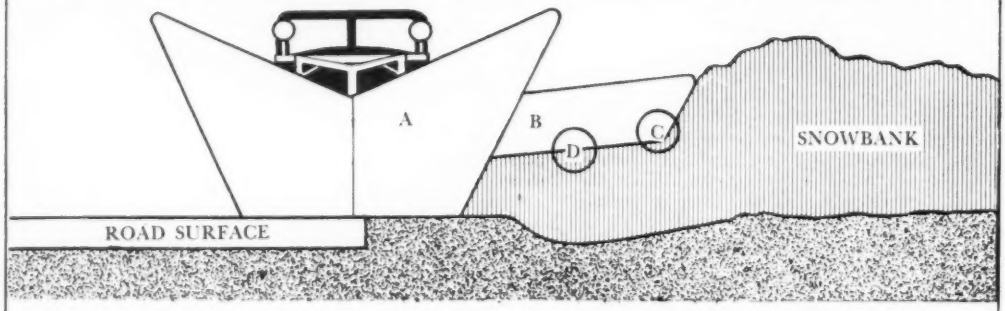
**94.** Full engineering details on the submerged contact aeration process of sewage treatment, including diagrams of plant units, area requirements, operating costs and other details are available in a bulletin of the Hays Process Co., Box 768, Waco, Texas. Check the coupon to get the facts.

### Designing Grit Chambers? Here's What You Should Know

**113.** A helpful bulletin filled with drawings of typical designs, operating data, clearly written text outlining the principles of grit chamber design and requirements for removal of grit free from organics is offered by the Dorr Company. Get your copy of Bulletin 6411 on the Dorr "Detritor" by checking the coupon or from The Dorr Co., Barry Pl., Stamford, Conn.

(Continued on page 36)


# THE FRINK *BEVELS* The Snowbanks




The beveling of snow banks has won universal acceptance for Frink V-Plows. Frink Sno-Plows are so constructed that they are wider at the mouldboard tips than at the cutting edge.

This type of plow design creates a beveled snow bank as shown in the above illustration. The plow mouldboard (Fig. A) and leveling wing (Fig. B) combine to produce beveled banks consisting of a pocket (Fig. C) and a shelf (Fig. D). This shelf and pocket create a drift area which discourage drifts from forming on the plowed surface.

Plows that leave straight banks permit drifting back on to plowed areas. Your drift problems are minimized when you buy a Frink Sno-Plow.

*Frink Reversible Type, One-Way Type, and V-Type Sno-Plows are interchangeable on the same truck attachment.*

NOTICE: If you have had to wait months for replacements for your present equipment then you will appreciate the service that we can now offer you.

**For details of this Sno-Plow write for catalog to nearest address below, Box PW5212**

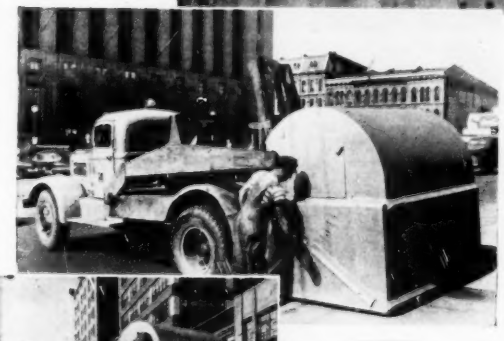
FRINK SNO-PLOWS, INC., CLAYTON, NEW YORK
DAVENPORT-BESLER CORP., DAVENPORT, IOWA
FRINK SNO-PLOWS of CANADA, LTD., TORONTO, ONT.

FRINK SNO-PLOWS

# The DEMPSTER DUMPSTER® Rubbish Collection System

## *Eliminates* DISEASE Carriers

In a single year rats cost an estimated $2 billion in damage to food, property and human life in the U. S. These disease carriers settle most commonly within a few feet of conventional garbage cans behind your business establishments, schools, grocery stores, etc. With rat-proof, scavenger-proof Dempster-Dumpster Containers, you can eliminate rats at rubbish accumulation points . . . keep rubbish completely out of sight at all times . . . and cut your collection costs in half at the same time! One truck-mounted Dempster-Dumpster, with only one man, the driver, picks up, hauls and empties a multiple number of these big containers, one after another. Without question, the Dempster-Dumpster System is the most sanitary method of bulk rubbish collection ever devised. Manufactured exclusively by Dempster Brothers, Inc.



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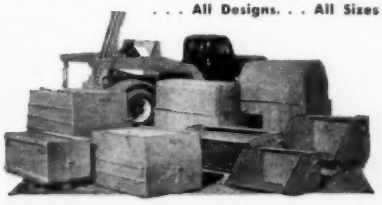

**DEMPSTER BROTHERS, 9122 Dempster Building, Knoxville 17, Tennessee**

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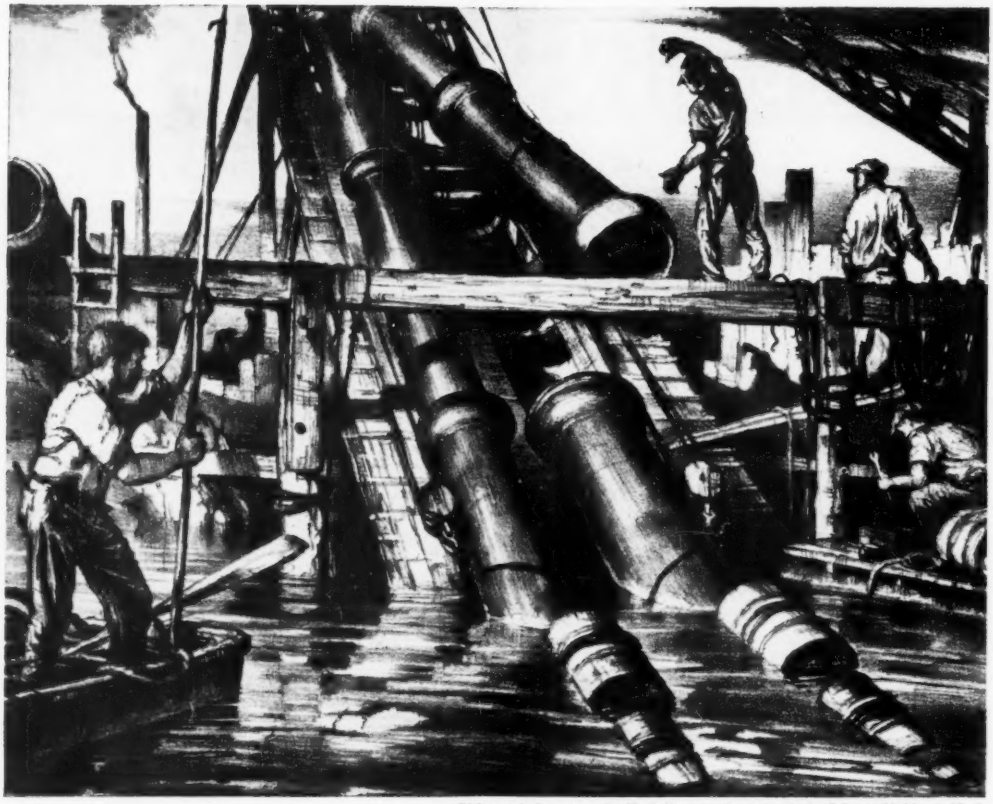

*Lithographed on stone for U. S. Pipe and Foundry Co. by John A. Noble, A. N. A.*

**WHEN A CAST IRON** water, gas or sewer line crosses a stream flexible joint pipe is frequently used. Joints that will deflect enough to meet installation and post-installation conditions and remain tight are most important in a submarine installation.

U. S. flexible joint pipe in all sizes, and pipe 30-inch and larger with other types of joints, are produced by the *pit cast* process. In sizes 2-inch through 24-inch, U. S. pipe is cast *centrifugally* in metal molds with bell-and-spigot, mechanical joint or plain ends.

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**WRITE for catalog on the 1½ yd. Model HM or the six other "PAYLOADER" sizes down to 12 cu. ft. bucket capacity.**

**PAYLOADER®**

THE FRANK G. HOUGH CO. • SINCE 1928


Now's the time to mail this month's Readers' Service card.

*(Continued from page 34)*

### End Root Problems With Root-Proof Sewers

**107.** Troubles caused by roots and corrosions in house connections can be eliminated by the use of root-proof Bermico sewer pipe. Full details on this smooth, waterproof, tight-sealing pipe available by checking the coupon, or write to the Brown Co. Dept. PW, 150 Causeway St., Boston 14, Mass.

### Data on Rotary Distributors For Sewage Treatment

**118.** Data on Infilco rotary distributors which feature low head requirements, uniform distribution, streamline design, double seal against sewage loss, and corrosion resistant construction, will be found in Bulletin 6400. For your copy, use the handy coupon or write Infilco Inc., Box 5033, Tucson, Ariz.

### All-Electric Floatless Liquid Level Control

**174.** Description of operating principles and applications of B/W controls show the simplicity and many uses of these all-electric, floatless devices. Get latest bulletin for engineering data, diagrams of typical installations and details of component parts. Check the coupon or write B/W Controller Corp., Dept. PW, Birmingham, Mich.

### Complete Data On Sludge Pumps

**193.** Sludge pumps, simplex, duplex, triplex and quadruplex, normal and heavy duty models, are described in Bulletin S48 issued by Marlow Pumps, Ridgewood, N. J. Check the handy coupon for your free copy.

### Durable Gratings and Treads Are a Good Investment

**147.** Gratings for walks around settling tanks and other parts of treatment plants, both out-doors and in, for stairways, floors and balconies, are described in an illustrated 16-page bulletin by Irving Subway Grating Co., 50-53 27th St., Long Island City 1, N. Y.

### Comminutors for Automatic Disposal of Coarse Sewage Solids

**152.** The problems connected with disposal of coarse sewage solids are eliminated by clean, odorless, automatic Comminutors. Full engineering data show the proper model for every size plant and furnish details of hydraulics and typical installations. Chicago Pump Co., 622 Diversey Pkwy., Chicago 14, Ill.

### Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

**191.** The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833. Detailed information is provided on bar screens, grinders, grit collectors, "Jigrit" washers, sludge collectors, feeders, conveyors and other related units. Photos and drawings of installations plus capacity tables complete this valuable booklet. Use coupon or write Jeffrey Mfg. Co., 947 N. 4th St., Columbus 16, Ohio.

### Vacuum Filters Feature Easy, Non-Clog Operation

**241.** Get full data on vacuum filters using double layers of continuous coil springs that insure continuous, non-clog operaiton. Coils are automatically cleaned at each revolution. Komline-Sanderson Engineering Corp., Peapack, N. J.

### Data Offered On Mixed Flow Pumps

**201.** Data on the complete line of Worthington Mixflo pumps of the two-vane, non-clogging sewage type is offered in 16-page bulletin W-317-H16. Salient features are outlined, typical sections, performance curves and general data for five types are included. Helpful charts aid shafting selection. Copies available by using coupon or from Worthington Corp., Harrison, N. J.

### Efficient Blowers for Activated Sludge Plants

**232.** Many advantages of Roots-Connersville positive displacement rotary blowers are described in Bulletin 22-23-B-13, which also provides characteristic curves for operation with constant speed, multi-speed and variable speed motors and details of several types of blowers. Get this helpful bulletin by checking the coupon. Roots-Connersville Blower Corp., Connersville, Ind.

### Design Data For Wet Pit Pump

**52.** Two types of vertical, centrifugal wet-pit pumps, a heavy duty bilge pump for handling solids-free liquids and a screenless sewage ejector, are described in Bulletin 3-8000 of Yeomans Brothers Co., 2000-1 N. Ruby St., Melrose Park, Ill. Pump and motor selection tables, typical layouts for drainage sumps and municipal booster stations and other helpful engineering data are included in this 24-page bulletin. Just check the coupon for your copy.

### Book Tells How to Control Root Stoppages

**249.** Details on the proven use of copper sulfate to control root and fungous growths in sewers are contained in a brand-new book published by Phelps Dodge Refining Co., 40 Wall St., New York 5, N. Y.

### Reference Book on Lubricated Plug Valves

**273.** Lubricated plug valves, including stick-proof lever sealed valves for easy operation and positive mechanical seal are fully described in reference books issued by Homestead Valve Mfg. Co., Box 550, Coraopolis, Pa. Check the coupon for your copy.

### How to Dispose of Sewage and Industrial Sludges

**281.** Get full information on the C. E. Raymond System of combined incineration and sludge drying providing high temperature deodorizing for nuisance-free sludge disposal. Flexible layouts fit large and small communities. Use handy coupon or write Combustion Engineering-Superheater, Inc., Flash Dryer Div., 200 Madison Ave., New York 16, N. Y.

**KOEHRING MUD-JACK®** raised sunken slabs at city bus terminal (above) . . . stabilized sub-grade support under the paved parking area without interrupting traffic. Small holes were drilled through the pavement . . . then, Mud-Jack pumped inexpensive soil-cement slurry into the holes, raised the concrete, leaving solid, permanent support. Compact, portable as a 2-wheel cart, this No. 10 Mud-Jack is ideal for city work . . . no inconvenience to the public, no detours necessary. Also check the bigger No. 50 Mud-Jack for preventive maintenance and repairs on extensive highway work. Saves time, money and labor.

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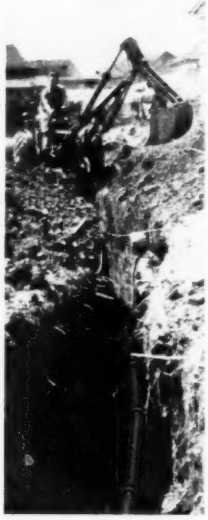

You can slash your digging costs with this fast, accurate, sturdy Henry Backhoe. It's built to TAKE it. Does an amazing job. Very flexible. Ideal for laterals, footings, septic tanks, graves and EVERY digging operation. Maximum reach 11 feet. Has powerful double acting hydraulic cylinders. Perfect operator control. Two models —B-8 and BA-8. Several width buckets can be furnished. Full swing of 160 degrees. A complete unit. Is quickly attached to your tractor. If you want to simplify EVERY digging job, SLASH costs and get more SPEED, get a Henry Backhoe—NOW. See your dealer or write direct.

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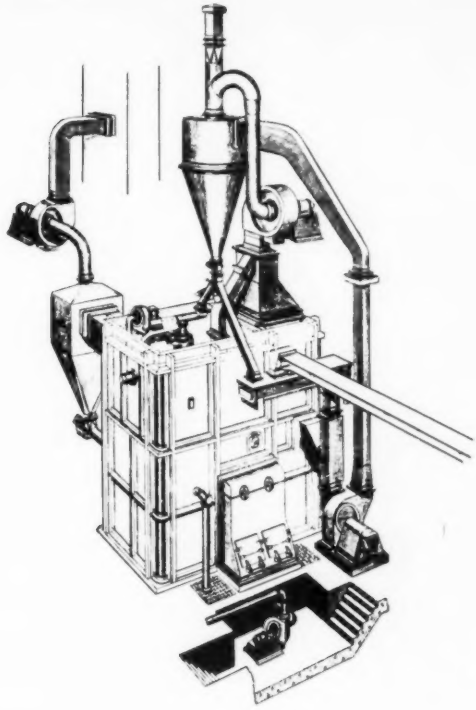

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Here is the *modern method* of sludge disposal – the C-E Raymond System of Flash Drying and Incineration. Continuously, automatically, this system incinerates thickened sludge to a fine ash, free from clinker and unburned materials... or flash dries it to fertilizer, containing all of the original fertilizer constituents.

C-E systems now in service are meeting the requirements of both large and small communities – serving equivalent populations from 6,000 to 3,600,000. The list below shows the most recent installations.

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| Camden, N. J. | Havens & Emerson |
| Chicago, Ill. (W. Southwest) | City Engineering Dept. |
| Fond du Lac, Wis. | Jerry Donohue Engrg. Co. |
| Houston, Texas | Greeley and Hansen |
| Lansing, Mich. | Drury, McNamee and Porter |
| Los Angeles, Cal. | Metcalf and Eddy |
| San Diego, Cal. | Frank Currie |
| San Francisco, Cal. | Clyde C. Kennedy |
| Schenectady, N. Y. | Havens and Emerson |
| Sheboygan, Wis. | Jerry Donohue Engrg. Co. |
| Washington, D. C. | Greeley and Hansen |
| Waterbury, Conn. | Malcolm Pirnie |
| Wyomissing Valley, Pa. | Albright & Friel |
| York, Pa. | Albright & Friel |

C-E Raymond Systems are flexible in layout, highly efficient and fully reliable; they provide for maximum utilization of waste heat. They mean for any community the end of stream or atmospheric pollution resulting from the disposal of sewage wastes.

The services of C-E specialists are available to help you plan for the most practical and economical answer to your sludge disposal problems. For prompt attention, get in touch with one of the Combustion offices listed below.

**Industrial sludges a problem?**
*C-E Raymond Flash Drying and Incineration Systems have been the answer for others. Write for information.*

B-586

**COMBUSTION ENGINEERING—SUPERHEATER, INC.**

**FLASH DRYER DIVISION**

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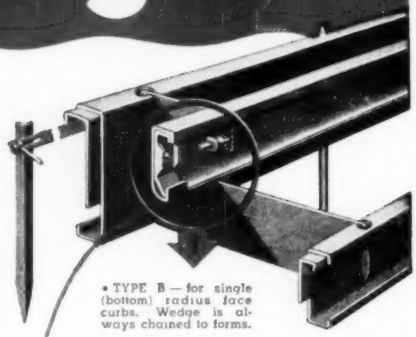
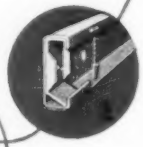


• TYPE B — for single (bottom) radius face curbs. Wedge is always chained to forms.



• TYPE A — for straight face curbs (no radii). Slide lock is rigid, positive.

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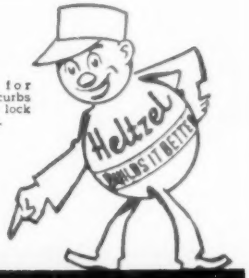


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### Handy Catalog Covers Complete Tractor and Grader Line

**70.** A new 20-page booklet in a handy pocket size features Allis-Chalmers complete industrial tractor line. The importance of wise buying and fitting the equipment to the job is emphasized. Don't miss your copy. Use coupon today. Allis-Chalmers Mfg. Co., Tractor Div., Box 512, Milwaukee, Wis.

### A "Quick-Way" Truck Shovel Will Handle Your Job

**82.** Four models of "Quick-Way" truck shovels, ¼ to ½ yd. capacity, and trench hoe, backfiller, crane, shovel, clamshell, pile driver or dragline attachments are ready to handle most every type of public works project. Get complete details by checking the coupon or write to "Quick-Way" Truck Shovel Co., Box 1800, Denver 1, Colo.

### Grading Can Be Faster, Cheaper and Easier

**96.** You'll like every feature of the Austin-Western 99H Grader. It has all-wheel drive, all-wheel steer, controlled traction, precision sideshift and a high lift, extreme reach, reversible blade. Get data from Austin-Western Co., Aurora, Ill.

### Be Sure to Investigate The Gledhill Grader

**117.** For economical maintenance of streets and highways, be sure to check the advantages offered by use of the Gledhill grader, product of the Gledhill Road Machinery Co., Galion, Ohio. For complete specifications on several models, just check the coupon.

### Helpful Booklet on Carryable Centrifugal Pumps

**129.** A booklet prepared to give practical information that will guide you in choosing the best type of pump for your requirements is offered by the Homelite Corp. Both gasoline and electric models are discussed, and requirements outlined for many applications. Just check the coupon for your copy. The Homelite Corp., 2125 Riverdale Ave., Port Chester, N. Y.

### Air Cooled Engines for Hundreds of Applications

**137.** Tested under severest conditions of long, hard use, these engines have earned world wide recognition as the "right" power of hundreds of applications. Get latest bulletin from Dept. PW, Briggs and Stratton Corp., Milwaukee 1, Wisc.

### Three-Wheel Roller For General Purpose Duty

**143.** A new 20-page bulletin describing general purpose 3-wheel rollers covers 8, 10, 12 and 14-ton gasoline and diesel models of the Huber line. Illustrations and comprehensive explanation show component parts of the rollers and describe the general duties of the units. For your copy of this attractive bulletin, No. H-150, write the Huber Mfg. Co., Marion, Ohio, or use the coupon.

### Trenching Made Easy With Hydraulic Dragshovel

**216.** The Bucyrus-Erie "Hydro-hoe", a completely hydraulic dragshovel has two separate digging actions to dig a level, scallop-free trench and greatly reduce hand trimming. Be sure to investigate this rugged, easily operated machine. For details write Bucyrus-Erie, Hydrocrane Div., So. Milwaukee, Wis., or check the handy coupon.

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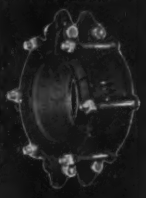

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### Surveying Instruments— Basic Tools for the Engineer

**228.** Be sure you get Bulletin 1052 of David White Co. when you need transits, levels and other top-quality surveyors gear. A full line of surveying instruments and accessories is described in their 42-page catalog. Get your copy by checking the coupon or write to David White Co., 315 W. Court St., Milwaukee 12, Wis.

### Profitable Construction with Payloader

**234.** A comprehensive, 12-page catalog filled with on-the-job photos showing a wide variety of earth-moving, material-handling, lifting and carrying jobs being performed by the multi-purpose tractor-shovels known as "Payloaders" is now available. Helpful job data, specifications and features of the complete Payloader line are included, with illustrations of useful accessories. Copies of this colorful catalog No. 217 can be obtained from The Frank G. Hough Co., 761 Sunnyside Ave., Libertyville, Ill., or by checking the coupon.

### Tractor-Mounted Backhoe Simplifies Digging Operations

**238.** Be sure to investigate the new Henry Backhoe to cut digging costs on laterals footings, septic tanks, graves. Easily attached to your tractor. Get full data from Henry Mfg. Co., 1752 N. Clay St., Topeka, Kansas, by using coupon.

### Choosing Trucks For Municipal Service

**264.** For all municipal services, trucks are needed that are high in efficiency and economy. Be sure to investigate the White 3000, engineered for high performance. Full details on White Super Power trucks from the White Motor Company, Cleveland 1, Ohio.

### Powerful All-Wheel Drive Trucks Ready for Any Service

**306.** Be sure to investigate the Oshkosh line of 4- and 6-wheel drive trucks, built to give dependable service to cities, counties and contractors, off-and-on the highway, for snow removal, road maintenance and other year 'round jobs. Handsome bulletins illustrating many models and showing details of rugged engineering available from Oshkosh Motor Truck, Inc., Oshkosh, Wis. Use the handy coupon.

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## SNOW AND ICE CONTROL

### Snow Plows for Every Street and Highway Need

**227.** In a new bulletin, No. 51-F, full details are given on the Frink reversible trip-blade "Sno-Plow", which has special design features to eliminate chatter and to permit quick adjustment to nine plowing positions or scraping position for ice removal. Check the coupon for your copy. Frink Sno-Plows, Inc., Clayton, N. Y.

### Uniform Salt Spreading Saves Material

**145.** The wide, thin pattern provided by Tarco "Scotchman" spreaders avoids salt waste, saves time and labor. Get Folder BL for full details on this spreader and table of material application rates. Use coupon or write Tarrant Mfg. Co., Dept. PW, Saratoga Springs, N. Y.

### Easy Storage Methods For Rock Salt

**230.** Low-cost storage for rock salt is described in a pamphlet available from International Salt Co., Scranton, Pa. Get your copy and check all methods for storing salt in bag or bulk ready for winter use. Use the handy coupon.

### Spreaders for Ice Control Work Save Labor and Speed Job

**261.** Only the driver is needed to spread salt or abrasives for ice control when a Flink Tail-Gate Spreader is used. Hydraulically driven, fully automatic unit is controlled from the cab. Check the coupon for the complete story. The Flink Co., Streator, Ill.

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## BUSINESS AND ADMINISTRATION

### Booklet Outlines Scheduled Preventive Maintenance

**223.** An interesting case history on reduction of equipment failures and less "downtime" through scheduled preventive maintenance is offered by Remington Rand Inc., Management Control Library, 315 Fourth Ave., New York 10, N. Y. Ask for Folder KD656 or check the handy coupon for your copy.

### 10 Reasons for Blanket Bond Covering Public Employees

**289.** As a part of their modern bonding program the National Surety Co. presents 10 reasons for having a Public Employees' Blanket Bond covering your personnel in forms offering greatest protection per premium dollar. Get Form 23163 by checking the coupon. National Surety Corp., 4 Albany St., New York, N. Y.

**For prompt catalog service always use the PUBLIC WORKS reply card or coupon.**

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## REFUSE COLLECTION AND DISPOSAL

### Efficient Material Handling to Reduce Incineration Costs

**130.** Blaw-Knox Buckets specially designed for refuse and garbage handling are described in 22-page Bulletin 2350. Illustrations show progress of material through a modern municipal incinerator plant. Dimensions and incinerator bucket specifications are included. Blaw-Knox Div., 2124 Farmers Bank Bldg., Pittsburgh 22, Pa.

### 20 Questions and Answers On Sanitary Landfill

**75.** The advantages of sanitary landfill, factors in site selection, kind and size of equipment needed, capacity of a given site and other important engineering considerations are discussed in Form 1084 prepared by the Tracksen Co., Dept. PW, Milwaukee 1, Wis. Check the coupon for complete information on this refuse disposal method.

### Investigate This Plan For Garbage Elimination

**164.** A new presentation, written especially for municipal officials, offers a modern solution for the garbage disposal problem. Be sure you have this up-to-date information on the elimination of city garbage collection by the use of Hotpoint Disposall units. Check the coupon now. Hotpoint Disposall Department, 5600 West Taylor St., Chicago 44, Ill.

### How to Build A Sanitary Land Fill

**260.** Proper use of equipment and the four steps necesesary to build a good sanitary fill are shown in an illustrated folder prepared by Drott Mfg. Corp., Milwaukee 12, Wisc. Check coupon today for your copy.

### Increasing the Efficiency of Bulk Rubbish Collection

**177.** Strategically spotted bulk containers can be handled by one man operating a Dempster-Dumpster equipped truck. Get full details of this cost-saving system of rubbish collection, as used by many cities to increase ef-

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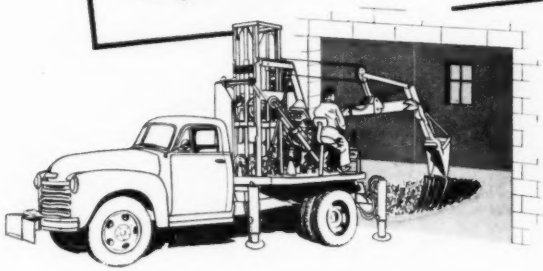

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FOR close quarter trenching, pit digging, and other specialized excavating, the Bucyrus-Erie Hydrohoe is the stand-out performer. Here's why:

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**123.** The sequence of operation for fast loading and refuse compression in the Gar Wood "Load-Packer" is illustrated and described in 8-page folder M 60, which also provides size data and details of hydraulic equipment. Be sure to check all features of the efficient Load-Packer system. Check coupon or write Gar Wood Industries, Wayne Div., Wayne, Mich.

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### Valuable Booklet Tells Soil Stabilization Facts

**206.** All forms of soil stabilization, using any type of binder with any suitable aggregate, are covered in "Soil Stabilization Methods," Bulletin 25 published by Seaman Motors, Inc., Milwaukee 3, Wis. Get this valuable booklet for complete information on processing methods and the many uses of the Seaman Pulvi-Mixer by checking the coupon.

### Levels Sidewalks and Curbs Quickly and Easily

**29.** How the Mud-Jack Method for raising concrete curb, gutter, walks and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a new bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 10, Wis.

### Get Data Now On This Catch Basin Cleaner

**34.** Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

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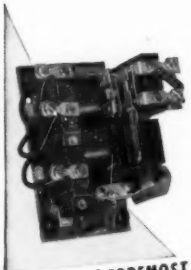

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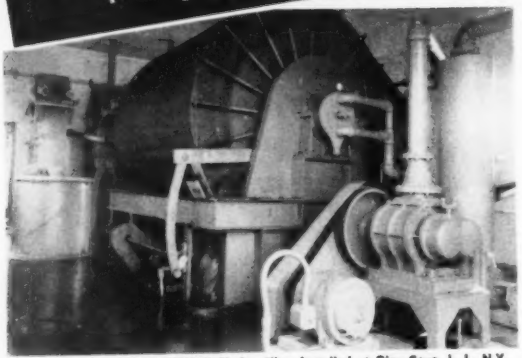

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**112.** Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

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### Bulletin Helps Pump Installation Design

103. Construction details, design, approximate dimensions and typical examples of performance of Economy double-suction centrifugal pumps will be found in 16-page Catalog A750, issued by Economy Pumps, Inc., Div. of C. H. Wheeler Mfg. Co., 19th and Lehigh, Philadelphia 32, Pa. This bulletin is profusely illustrated to show many types of pumps and methods of drive for water works service. Check coupon for your copy.

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**148.** McWane 2" cast iron water pipe with threaded joints and precaulked bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

### What You Should Know About Meter Setting and Testing Equipment

**166.** Complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of

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**173.** A comprehensive, 48-page book on Layne Water Well Systems covers gravel wall wells, underreaming, cemented walls, rock wells and other well types. Applications of shutter screens and vertical turbine pumps are shown, together with water treatment and conditioning equipment. Ten pages are devoted to useful engineering tables and measurement data. Check the coupon today or write Layne & Bowler, Inc., Dept. PW, Memphis 8, Tenn.

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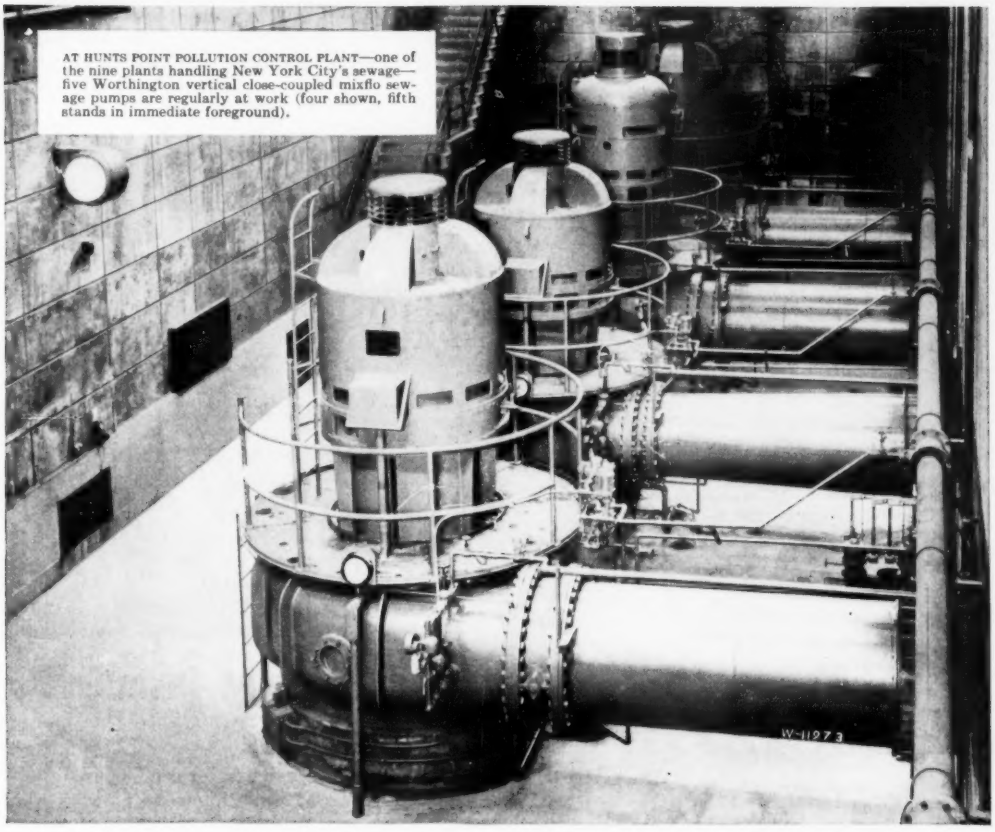


AT HUNTS POINT POLLUTION CONTROL PLANT—one of the nine plants handling New York City's sewage—five Worthington vertical close-coupled mixflo sewage pumps are regularly at work (four shown, fifth stands in immediate foreground).

# 1689 mgd of New York City's Treated Sewage handled by Worthington pumps

If you want to see Worthington sewage pumps—large and small—at work, you can't go wrong by looking inside six of the nine major disposal plants that serve the City of New York. A total of 1689 mgd installed capacity of Worthington sewage pumps are now in regular use in the world's largest city.

New York's installed capacity of sewage pumps is among the largest in the U. S., so you'd naturally expect the city's public works officials to be familiar with Worthington performance—performance that years ago gave Worthington its position as world leader in the manufacture of pumping equipment.

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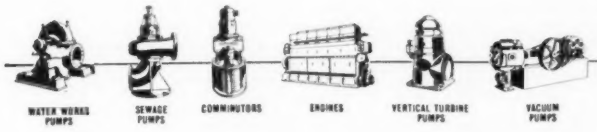
W.2.3

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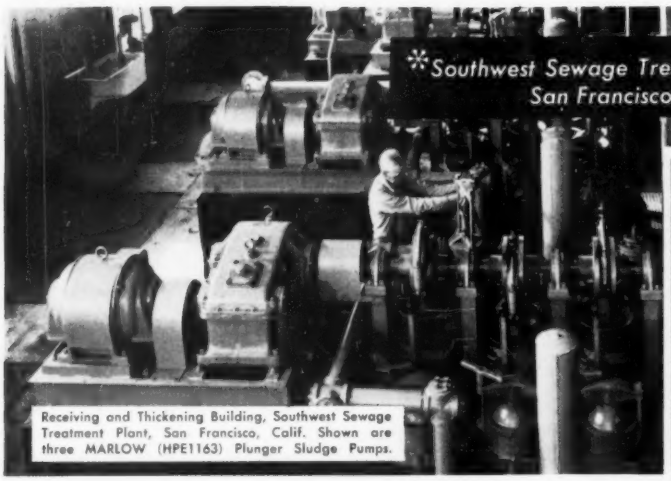
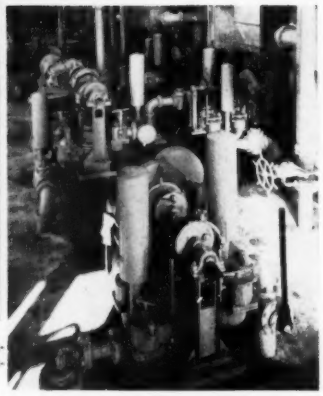


*Southwest Sewage Treatment Plant, San Francisco, California

Receiving and Thickening Building, Southwest Sewage Treatment Plant, San Francisco, Calif. Shown are three MARLOW (HPE1163) Plunger Sludge Pumps.



Filtration and Elutriation Building, Southwest Sewage Treatment Plant, San Francisco, Calif.

## ...23 MARLOW Plunger Sludge Pumps installed!

### for *re-circulation, draw-off* and *transfer of sludge*

ONCE MORE—MARLOW Pumps are relied on for continuous, dependable performance . . . and the list of municipal installations continues to grow. Already over 400 municipalities—across the country—have installed Marlows because they are efficient, reliable and durable. They give that extra "plus" when performance counts. Marlow Plunger Sludge Pumps are the direct result of many years of 'on-the-job' research and development . . . they have set the pace for advanced pump engineering to meet job specifications.

**At the Southwest Sewage Treatment Plant, Marlows do a complete job:**

- **. . . for re-circulating sludge in digesters and transfer of sludge between digesters.**
- **. . . for draw-off of sludge from digesters *at a steady rate.***
- **. . . for transfer of processed sludge from one elutriation tank to another.**
- **. . . for transfer from final elutriation tank to vacuum filters.**
- **. . . for transfer of raw sludge from thickening tanks to holding tanks or digesters.**
- **. . . for re-circulation of raw sludge in holding tanks or between holding tanks and receiving and thickening tanks.**

MARLOW PLUNGER SLUDGE PUMPS are available with single, double, triple and quadruple plungers. 360 to 30,000 GPH standard displacement.

Remember . . . for heavy sluggish pumping of any kind MARLOW does the job better because it is designed better. MARLOW *means* — good pumping.

*Write today for details.* Let a MARLOW Sales Engineer give you the facts, figures and specifications on the complete MARLOW Pump line.

**MARLOW PUMPS** RIDGEWOOD, NEW JERSEY

Branch Factory, De Queen, Arkansas • Other Factories in France and England

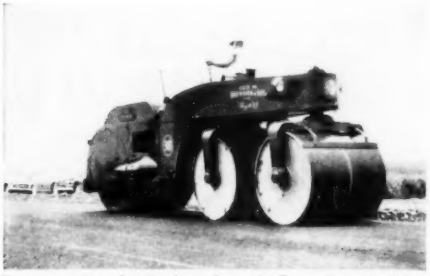
094

Now's the time to mail this month's Readers' Service card.

# Announcement

## Torque Converter Drive in Road Rollers Offered by Buffalo-Springfield—another "First" Pioneered by the Leader in Roller Design

With the new Buffalo-Springfield Torque Converter Drive, operators can roll at *any* speed from 1 to 5 mph without shifting gears. Controlled by a unique governor set up, the torque converter will deliver whatever power is required (up to full engine capacity). Power changes instantaneously to suit varying requirements. This means that variations in materials and grade are compensated for automatically! Slipping the roll is virtually eliminated. Courses of all kinds are compacted more smoothly, easily and efficiently than ever before! The new transmission is offered as *optional equipment* on its 8-16 ton 2-axle tandems, 3-axle tandems and 3-wheel rollers.



This is one of the first 3-axle tandems with Torque Converter Drive at work on the New Jersey Turnpike—built by Buffalo-Springfield for Geo. M. Brewster & Son of Bogota, New Jersey.

Buffalo-Springfield Torque Converter Drive has been *proven conclusively* in the field. For two construction seasons, a fleet of 2 and 3-axle tandems has operated on a wide variety of work including all courses of the New Jersey Turnpike—from special classified sub-grade material and loose stone base to bituminous concrete wearing surfaces.

With the introduction of the new drive you now have your choice of two great transmissions to meet every rolling requirement. Exclusive Torque Converter Drive to give you an *infinite* number of speeds, *all* at full power. And Buffalo-Springfield's exclusive 4-speed transmission which was introduced in 1945 to provide *more* speeds at full engine power than either 2 or 3-speed transmissions.

Naturally, rollers with Torque Converter Drive are built with the same characteristics of long life and low maintenance that have made Buffalo-Springfield famous for more than 60 years.

See your Buffalo-Springfield Distributor or write the factory for complete information on Torque Converter Drive.

NOTE: 4-speed transmission standard equipment on all rollers except KT-7. Torque Converter Drive is available at extra cost on models listed above.

*There's a Buffalo-Springfield Distributor conveniently located to serve you.*

BUFFALO-SPRINGFIELD
ROLLER COMPANY

BUFFALO SPRINGFIELD
THE STANDARD OF COMPARISON
SPRINGFIELD, OHIO

THE LEADER IN ROAD ROLLER DESIGN AND MANUFACTURE

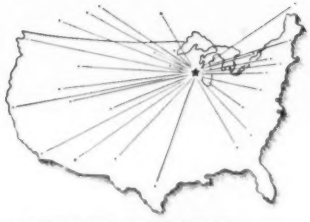
Thousands use our Readers' Service card to keep up to date . . . do you?

Oshkosh ALL-WHEEL DRIVE TRUCKS ARE UNSURPASSED FOR DESIGN . . . SERVICE and DEPENDABILITY!

Here are two, of many, significant reasons why Oshkosh 4-wheel drive trucks, for 34 years, have been chosen by states, countries and municipalities for snow removal:

1. Oshkosh's 4-wheel drive provides ground-gripping traction to buck through heavy drifts easily. And the "secret" of Oshkosh's traction is the automatic locking differential in the transfer case—only Oshkosh has it!
2. Because of Oshkosh's unsurpassed engineering and construction, these heavy-duty trucks withstand the brutal strains and stresses of snow removal, and then with equal efficiency, shift over to road maintenance, on-and-off highway hauling and other year 'round jobs with minimum upkeep expense. Ask any user!

*Write for new descriptive literature which shows why—feature for feature—no truck equals an Oshkosh!*

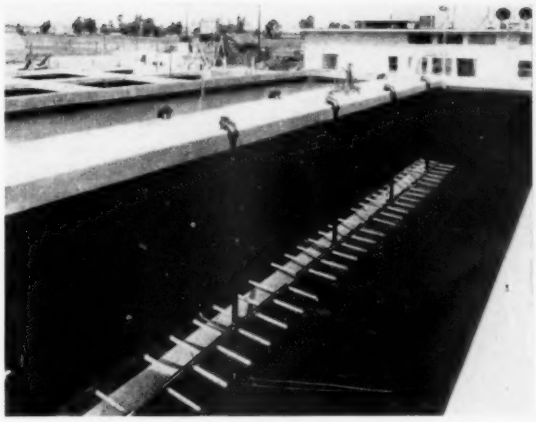


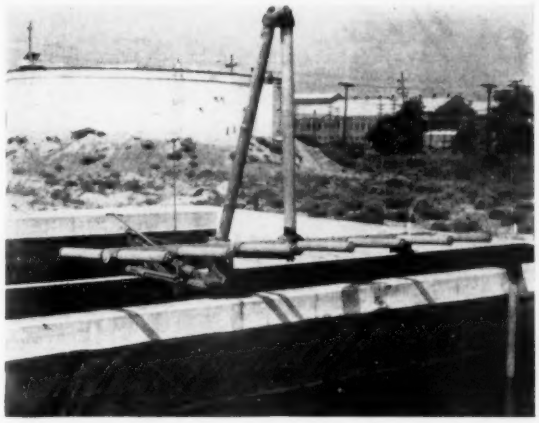
24-HOUR-A-DAY PARTS SERVICE . . . THROUGHOUT UNITED STATES AND CANADA

OSHKOSH 4 and 6 WHEEL DRIVE TRUCKS

OSHKOSH MOTOR TRUCK INC.
OSHKOSH WISCONSIN

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.





**Two installations** of porous tubes in Chicago Pump Company's Swing Diffusers. Tubes in operating position at the bottom of an empty sewage tank (above) are swung to the tank top for easy inspection and servicing (below).

# More uniform aeration with Norton ALUNDUM* tubes, because... *they're seamless!*

Long experience with a number of installations in activated sludge sewage plants has established the fact that the most uniform and efficient diffusion of air is accomplished with seamless tubes. Only Norton Alundum tubes have this seamless feature.

Important, too, is the fact that they're the *only* porous tubes made by Norton's patented "controlled structure" process — which means that, like all Norton porous mediums, they're unequalled for uniform distribution of pores.

Finally, their exceptional resistance to breakage, chipping and acid and alkaline conditions cuts replacement and maintenance costs throughout a long, efficient service life.

**TO MEET YOUR PARTICULAR NEEDS**

Norton ALUNDUM porous mediums — plates, tubes and discs — are made in a wide range of sizes. Plates for rapid sand filters in water filtration; plates and tubes for aeration in activated sludge treatment; seamless tubes for diatomaceous filters in municipal swimming pools.

**GET THE COMPLETE STORY**

The charts, tables and other helpful data in Norton's illustrated booklets show the way to new efficiency and economy in your use of porous mediums. Ask your Norton representative, or write to NORTON COMPANY, 230 New Bond St., Worcester 6, Mass.

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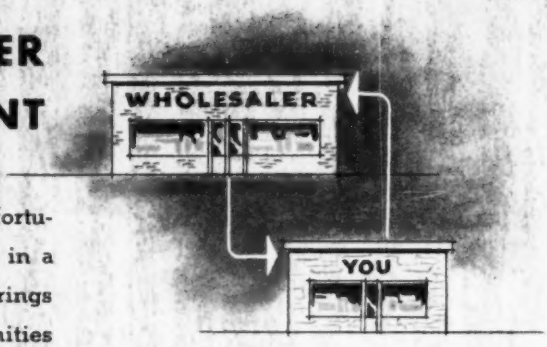
# YOUR WHOLESALER IS CONVENIENT




You can consider yourself fortunate in being able to share in a system of distribution that brings to you so many real opportunities through a wholesaler.

You, no doubt, fully recognize the many advantages that accrue to you by having close at hand a wholesaler who can appreciate your purposes and can furnish you with the kind of products that best meet your needs right when you want them—a wholesaler who also takes a personal interest in your welfare and is ready to extend a helping hand whenever you are confronted with special problems which demand the advice of someone having a wider perspective of things along with more varied experience.

Happily, most men, like you, consider their wholesalers their good neighbors, possessing such thorough knowledge of their communities that their requirements can be anticipated and supplies made available in time for use.

All good wholesalers know what, when and how to buy in order to be prepared for your demands. You can be certain, too, that all good wholesalers are familiar with the high quality of Wolverine tube.

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**BUY FROM YOUR WHOLESALER**

VOL. 83 • No. 12 DECEMBER 1952

Public Works Magazine

# PARKING METERS PAY THE BILL

GUY BROWNING ARTHUR

THE entire cost of traffic regulation in Portland, Oregon, is paid by the revenue from parking meters. This includes the cost of shifting to one-way traffic in the downtown grid of 280 city blocks and 21 miles of streets—said to be the largest one-way grid in the United States. The cost of this project alone was $73,000.

With characteristic foresight the city thought its way through the proposed use of parking meters. It avoided the hasty procedures which now haunt city administrations which installed meters without realizing that no class can be specially taxed except with proper legislation; and also those which overlooked the companion principle that revenues from the meters can be rightly used only for the benfit of those taxed—in this case the motorist.

An ordinance, passed by the city council authorizing the "installation, use, and maintenance" of parking meters, limited the use of revenues to the improvement of parking and the regulation of traffic. Care was taken to bring a substantial number of merchants and other interested persons to the support of the proposal before the enabling measure was introduced in the council for consideration. Objectors sought to restrain the action of the council in court. The favorable decision there was appealed to the Supreme Court of Oregon, where the opinion of the lower court was upheld.

How different this deliberate action was from that in other places where meters were installed without proper authorization, and where the revenues were deposited in General Funds which became "sinking funds" for the money, with little accounting to the taxpayers. Less notice was taken of the rights of the special class, motorists, who were taxed illegally, and who had no discernible return for the fees taken from them.

### *Ordinances and Laws*

Up to the point where a nickel pays for the privilege of parking for a fixed period, nothing can be said. Up to that point we welcome the "mechanical policeman." Courts have ruled that a city may use the meter as a traffic regulating device. But when a city skids from regulation into revenue-producing, and uses the proceeds taken from the motorist "class" for purposes not related to parking or traffic regulation, its action is illegal. Court decisions are shifting steadily to clarify this view.

No state was as far ahead as Portland until Iowa passed its "model law," now recognized as such, which says that meter receipts must be used for the alleviation of parking difficulties. Other states are follow-

● **TO SEE what is proposed, a neighborhood group is called in to study a model showing proposed changes and improvements in the street layout in their section.**

ing this trend. Evidence accumulating in legislatures, courts, and highway councils leads to the belief that the principle clearly stated in the Iowa law will become the law everywhere.

Portland has another provision worthy of note. In any calculation of the amount of money which can accrue from the use of meters, the fines for over-parking are a major item. The fines may total 50% of the money derived from lawful use of meters, depending upon the intensity of policing the meters.

It can be properly objected that money taken in fines should not be used to finance the policing, for such a practice might bring about abuses in policing to gain more revenue. That would be like the old-time practice of having a Justice of the Peace make his living from fines.

So Portland puts all the money collected in fines for over-parking, as well as other parking fines, grouped as "parking tag revenue," into the General Fund. But these moneys are isolated as such, and can easily be studied as a traffic regulation item. The busy Clerk of Court, D. B. Palmer, made a report on this revenue for the last five years in a few minutes. From $117,167 it rose in five fiscal years to $276,375, with a total for this period of $1,414,238.

### *Policing Is Serious*

Like everything else in the city administration this policing of traffic is deadly serious, and Portland is a tough spot for the careless motorist. Ten dollars is the usual fine for passing a stop sign, and there isn't any haggling about it. For an over-parking ticket a driver pays one dollar. If he doesn't appear to pay his dollar within a week he receives a notice that his fine is now two dollars. And if he doesn't do something about it for another week a warrant is sworn out and delivered by an officer. Five dollars is now added to the bill, and his fine is seven dollars. A "no-fix" ticket system was adopted a long time ago.

Parking meter revenues for the last four fiscal years are shown in Table I.

**TABLE 1. — PARKING METER REVENUES**

| | |
|---|---|
| 1947-48 | $262,049.68 |
| 1948-49 | 336,305.68 |
| 1949-50 | 508,359.90 |
| 1950-51 | 545,806.00 |
| Total | $1,652,521.26 |

About 4,640 meters are in use today. In 1946 there were only 2,110, and in the following year 2,165. Since then the rise has been rapid.

Three time periods are in effect: —2,215 are called "4 nickel, 2 hour;" 1,923 are styled "2 nickel, 2 hour;" and 502—with red tops— are "1 nickel, 30 minutes." Thus in some areas you can pay a nickel for staying 30 minutes—only; in another a nickel pays for 30 minutes—but you can put in four nickels to stay two hours, and in the third one nickel pays the rent for one hour, but you can put in two nickels for two hours.

Expenditures of the meter fund for the year 1950-51, as shown in Table 2 reveal the scope of activities in the Traffic Bureau:

**TABLE 2— METER FUND EXPENDITURES**

| | | |
|---|---|---|
| Traffic engineers | $80,000 | 14.6% |
| Traffic officers | 170,000 | 22.0 |
| Maintenance of meters | 48,000 | 8.8 |
| Maintenance of signals | 55,000 | 10.1 |
| Maintenance of signs | 20,000 | 3.6 |
| Maintenance, other | 35,000 | 6.4 |
| Equipment | 11,000 | 2.0 |
| Traffic Comm. | 25,000 | 4.6 |
| Signals and controls | 115,000 | 21.0 |
| Signal lighting | 17,500 | 3.2 |
| Accounting and records | 6,000 | 1.1 |
| Miscellaneous | 14,500 | 2.6 |
| Total | $704,631.19 | 100% |

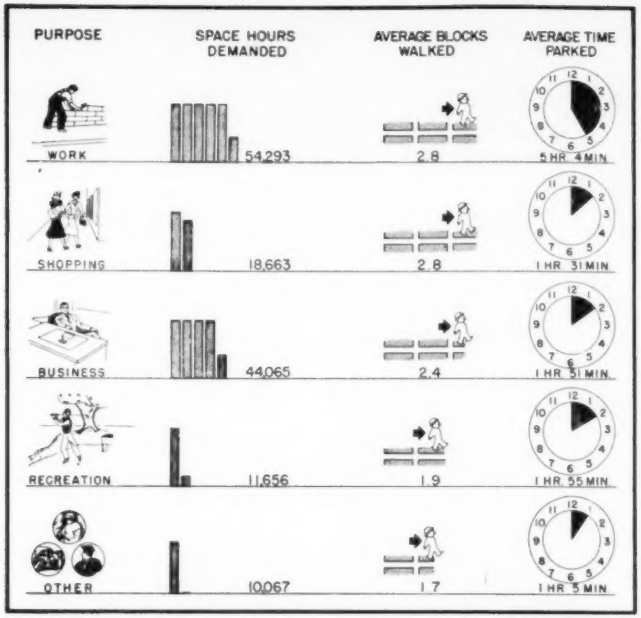
This total does not agree with the total fees reported in Table I because some money came from miscellaneous sources, and other money was left over from the year before. This year not all the expected receipts have been budgeted, and a surplus will remain.

All of the agencies concerned with traffic regulation have grown out of the beginnings of serious study of the city's traffic problems, developing with the growth of income specifically set aside for this purpose. The line of responsibility starts in the organization with the Mayor, Mrs. Dorothy McCullough Lee, who holds the portfolio of Commissioner of Public Safety in the five-post council, commission form of government. It runs through the Bureau of Traffic & Transportation to the Traffic Engineer, Fred T. Fowler, who has held this job through a series of administrations. He has kept well out in front among students of traffic regulation, and has held the respect of the various councils and officials through the years.

### *Traffic Surveys*

In 1946 a Portland Metropolitan Traffic Survey was undertaken. The report is in two parts. One part is an Origin-Destination Study, carried on with help from Oregon's State Highway Department, the Bureau of Public Roads, and the Federal Works Agency. The other, a Parking Study Report, was done with the help of the Bureau of Public Roads, the U. S. Department of Commerce, and the State Highway Department.

● DRIVERS give pedestrians right of way, but the problem is not entirely licked yet.




● **PARKING** requirements study shows purpose, space-hours and average time.

which passengers in vehicles passed the counting stations. The totals in figures are given here in percentages of the whole: Auto drivers, 47%; auto passengers, 24.5%; public transit, 28%; taxis, 0.4%; trucks, 0.1%. The movement of people by passenger cars was 71.5%. This pointed up conclusions that are basic to traffic regulation and parking facilities.

Portland was compared with other cities as shown in Table 3.

This Origin-Destination study taken alone was of tremendous value. But it was a mass of information to be interpreted and applied to specific phases of the whole problem. The statement that 18.6% of the trips entering and leaving the study area have either an origin or destination in the central business district—an important finding—doesn't picture the downtown situation as a pedestrian or merchant saw it at that time. Or to say that 70% of all cars coming to town parked in or near the business district is still abstract.

Sheer pressure of traffic congestion made business people aware of the situation.

(*Continued on page* 118)

All developments in the regulation of traffic since the completion of these two studies are based upon their findings.

Portland has nine natural barriers, or control points, for the Origin-Destination study, in the eight bridges over the Willamette River and the Interstate Bridge. Nearly all traffic in and out of the business area, which is on the west side of the Willamette, must use one of these bridges.

A 5-day count of vehicles totalled 210,082. The flow of taxis was more uniform than that of trucks and passenger cars, but even at its "high" in the late afternoon and early evening it never reached 300 on the 24-hour graph. Trucks peaked at about 9 AM at 2,000, dropped a little during the noon hour, and rose a trifle higher than 2,000 between 3 PM and 5 PM.

The flow of cars varied more through the day and night. It stood a little above zero in the wee small hours, and rose from 6 AM to 9 AM to 12,000. A low valley follows the morning rush. Then a steady rise begins at 3 PM which soars rapidly to 18,000 cars by 6 PM. It drops away at almost the same angle on the graph to about 6,000 at 9 PM, and then slips off to zero.

This graph summary of the traffic count was broken into bands representing the different purposes for

**Table 3—Traffic Survey Data from Seven Cities**

| *City* | *Population* | *Autos per dwelling* | *People per dwelling* | *Trips per person* | *Trips per dwelling* |
|---|---|---|---|---|---|
| Baltimore | 912,900 | 0.45 | 3.32 | 1.35 | 4.5 |
| Charlotte, N.C. | 100,000 | 0.51 | 3.51 | 1.10 | 3.8 |
| Denver | 361,000 | 0.72 | 3.10 | 1.64 | 5.1 |
| Ft. Wayne | 114,900 | 0.75 | 3.33 | 1.15 | 3.8 |
| Providence, R.I. | 437,500 | 0.54 | 3.16 | 1.34 | 4.2 |
| Seattle | 515,300 | 0.64 | 2.77 | 1.68 | 4.6 |
| Portland | 453,100 | 0.68 | 2.97 | 2.07 | 6.1 |

● **PORTLAND** makes many photographs from the air to facilitate traffic studies.

# PROCEDURES AND HAZARDS IN

F. R. BOWERMAN,

Sanitary Engineer

County Sanitation Districts of

Los Angeles County, California

THE twelfth survey of their sewer ocean outfalls was recently completed by the County Sanitation Districts of Los Angeles County. These outfalls extend from White's Point seaward to a distance of 5,000 ft. The pipe lines, one 60 inches in diameter, the other 72 inches in diameter, are constructed of reinforced concrete; they are embedded in rock trench for the first half of their length and flexibly jointed for the last half, where they are laid directly on the sandy ocean floor. The outfalls are inspected at least once every year by divers to determine the soundness of the construction and the tightness of the joints.

To facilitate the inspection, a technique has been devised whereby the diver proceeds along the pipe without being impeded by the relocation of the boat from which he operates. For complete protection for the diver, it is absolutely essential that the boat, the diver's only source of air and his only physical connecting link with the water surface, be always under control. To afford this protection, four anchors are placed, with the aid of a small auxiliary water-taxi as indicated in the sketch herewith. With proper placement of the anchors, it is possible to slack off on the outer-most anchor-lines while taking in on the shore-side anchor-lines. By thus "walking" the boat along the pipe it is always within a short distance of the diver who is busy inspecting the pipe below. The necessary power to move the 40-foot boat used as the diving platform is provided by a capstan which can exert a pull on any desired anchor-line. Using this technique, it is possible to traverse 5,000 feet of pipe line from its seaward end, at a depth of 110 feet, to its shore termination in two days. With standard procedures, in which the diving boat is moved only at intermittent intervals, the diving time would be three times this long. The "walking" technique is particularly suited to calm or nearly calm conditions which requires that the diving be completed by noon to avoid afternoon wind waves.

● **DIVER climbs into the boat after "walking the sewer line" underneath.**

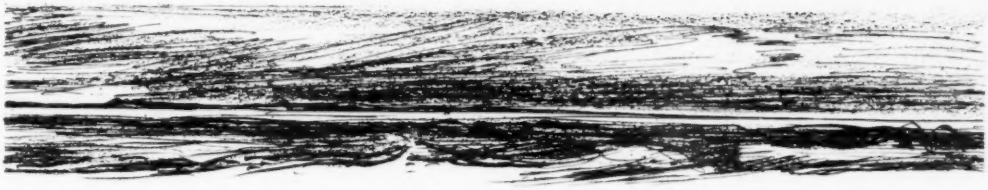
● **DRESSING the diver is considerable of a two-man job and takes time.**

### *Inspection Procedure*

To facilitate note-keeping on the condition of the line an amplifier system is used whereby the diver's comments and instructions can be heard clearly at any point on the afterdeck. For the diver's protection in an emergency, radio communication with the shore is available and a decompression chamber is maintained in constant readiness at the nearby Sanitation District's Joint Disposal Plant.

The diver commences the undersea observation at the greatest depth of the outfall and progresses shoreward to take advantage of the "natural" decompression he experiences as he walks toward shallower waters. His first assignment is to inspect each of the three-port diffusers which are located at the ends of the outfall sewers. Near the diffusers his visibility is sharply reduced by the sewage field, which spreads at the ocean's surface more than a hundred feet overhead. Limited to a visibility of from two to three feet, the diver must bring the view-plate of his helmet close to the point of observation and must augment his visual sense by using his sense of feel. With the sewage at a temperature of about 75°F. and the ocean temperature at 50°F. on the ocean's floor, the diver's sense of temperature becomes an extremely sensitive means for detecting leaks or for studying the jets of sewage that flow from the ports of the diffusers.

After the diffuser has been thoroughly inspected for structural soundness, the diver climbs onto the pipeline and half-walks, half-crawls along the line. Each cast-iron joint and manhole is carefully scrutinized by sight and feel, while the pipe-sections are rapped with a hammer or pickax to determine the soundness of the concrete. The re-



# OCEAN OUTFALL INSPECTION

sounding ring of a solidly struck blow can readily be heard through the amplifier on the boat.

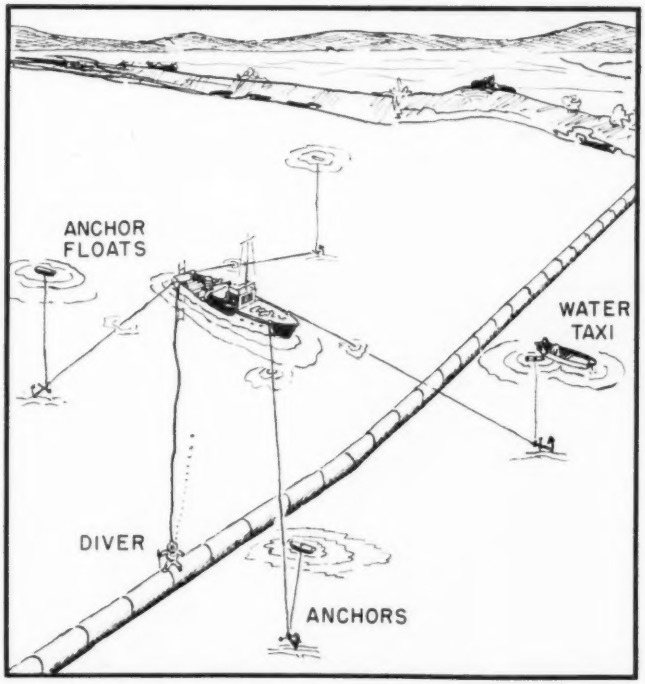
### *Hazards—Physical & Mental*

As the diver travels shoreward, the visibility increases rapidly; on calm days the diver can see a hundred yards or more, while on days with moderate or heavy ground swells the visibility is reduced to a few yards by the suspended sand. As in all previous inspections no leaks were discovered and the pipe-sections, joints, and manholes were found to be structurally sound—in spite of the recent Tehachapi and Bakersfield earthquakes.

One of the difficulties faced by the diver is an abundant growth of bull-kelp, which attaches itself firmly to the pipe and impedes the diver's progress. A profusion of sea-life exists in the vicinity of the outfall and some of the underwater denizens are not such as to contribute to the diver's peace-of-mind. Curious sharks are usually harmless, but an occasional shark serves to keep the diver alert to his surroundings. Sculpin, small fish with poisoned barbs, must be carefully avoided, as a wound from one of them causes temporary paralysis. Sheepshead, a strange-looking fish with a head like a sheep's skull and a mouth full of sharp, canine-like teeth, can bite holes in the diver's rubber suit, causing serious leaks. California seals and sea-lions abound in the coastal waters and, while normally playful, can be a serious threat to a diver. "Killer" whales, with jaws large enough to bite a man in two, have been observed in the area during the inspections.

The diver's approach to such dangers is a philosophical one: he takes all precautions within reason and accepts the remaining hazards as a part of the job. Caution is the deep-sea diver's continual watchword. To paraphrase a saying commonly used with reference to aircraft pilots: there are old divers and there are bold divers, but there are no old, bold divers.

The inspection was made under the supervision of Carl G. Busch, resident engineer. Directing the operation was veteran skipper, F. R. Smith. The diver, who has full responsibility for determining the actual physical condition of the line, was Kenneth K. Knott, former Navy salvage diver and presently employed by the Sanitation Districts in their tunnelling operations under the Palos Verdes Hills. Other personnel included a diver tender, skipper for the water-taxi, and two deck-hands. C. R. Compton, Assistant Chief Engineer, has direct charge of all field operations; A. M. Rawn is Chief Engineer and General Manager.




● **HOW the diver's service boat is controlled during underwater inspection. The anchor floats permit "walking" the boat to keep it in proper position above diver.**

***Mr. Bowerman went down himself to see what a fish-eye view of a sewer outfall looked like. He reports his experience in a letter to the Editor which will appear next month.***

# 50 Percent Reduction in POWER COST

ONE Worthington dual fuel engine is in virtually continuous operation in the David City, Nebr., municipal power plant and currently is supplying more than 96 per cent of that city's total electricity requirements. Taking over the load from a steam turbine, the engine cut fuel costs more than $14,400 in its first full year of operation—a cost reduction better than 50 per cent.

A community of 2,300 population, David City is the county seat of agricultural Butler County. The city has been producing power since 1916 when it took over a privately owned 80-kw steam plant. In recent years, it has been faced with the problem of rising costs of fuel, labor and other elements of operating expenses. It was decided that new, modern generating facilities were the best means of combating this trend. In August, 1949, the city put into operation a 4-cycle supercharged Worthington dual fuel engine, a 7-cylinder unit rated, at David City's altitude, at 1440 hp.

The effect of the new engine is clearly reflected by the operating statistics for the past five years. For the year ending April 30, 1947, with a steam turbine and coal-burning boilers, fuel costs were 11.79 mills per kwh; in 1949, with one boiler burning natural gas, costs were cut to 9.58 mills; in 1951, the first full year of dual fuel operation, fuel costs were 4.75 mills per kwh. This represents a saving of better than 50 per cent.

According to L. J. Reinhardt, Light and Water Commissioner, the dual fuel engine runs continuously and carries the entire load except when it is shut down briefly for normal preventive maintenance. It is the practice to run the old steam turbine once every three weeks while the Worthington engine is under inspection.

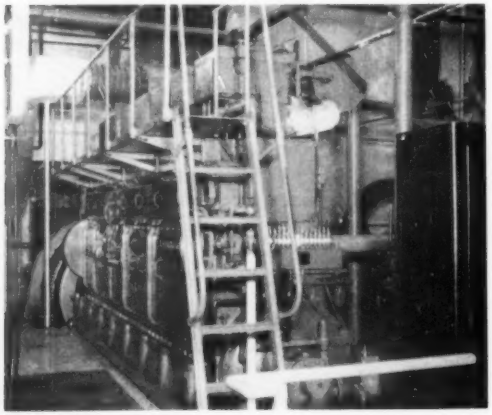
Continuous operation means that the dual fuel unit must carry a varying load. J. H. Shafer, the chief engineer, reports that load runs from a 200-kw valley to a 700-kw peak, with an average production for the dual fuel engine of 369 kwh. Obviously this light load does not permit maximum engine efficiency and makes even more impressive the fuel economies attained.

In designing the plant, the dual fuel engine was carefully integrated with the existing steam equipment. For example, engine exhaust gases which drive the engine's turbocharger then pass through a waste heat boiler. This provides 5 to 10 pounds of steam, which is used to keep boiler feed water hot and cut the time required to start the turbine.

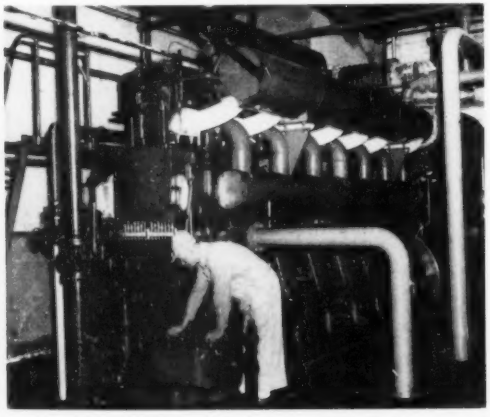
To insure the proper air-fuel ratio, intake of filtered air to the engine is controlled automatically to match the varying load as indicated by exhaust temperature. The dual fuel engine uses natural gas at 12 psi as its principal fuel. A small constant charge of fuel oil is injected to ignite the gas. For 100 per cent oil operation, there is an individual pump for each cylinder.

If gas pressure fails, the engine switches instantly to full oil operation and the governor, which had been regulating gas consumption, controls the quantity of oil injected. Mr. Shafer reports that the engine uses 45 gals. of pilot oil in 24 hours of dual fuel operation. As a full diesel, the unit produces between 13 and 14 kwh for each gallon of fuel oil consumed.

Plant operations are directed by Commissioner Reinhardt under the supervision of Mayor Earl Tilma and the Light and Water Committee of the Council, of which Richard Zeilinger is chairman and Roy Welte and Kenneth Nixon are members.



● **OPERATING** on a very light load, this dual fuel engine produces power at a total fuel cost of 3.98 mills per kwh.



● **THIS** Worthington dual-fuel engine operates 96 per cent of the time and carries a large part of the regular load.

# SALT WELL
## *Furnishes Brine for Softening*

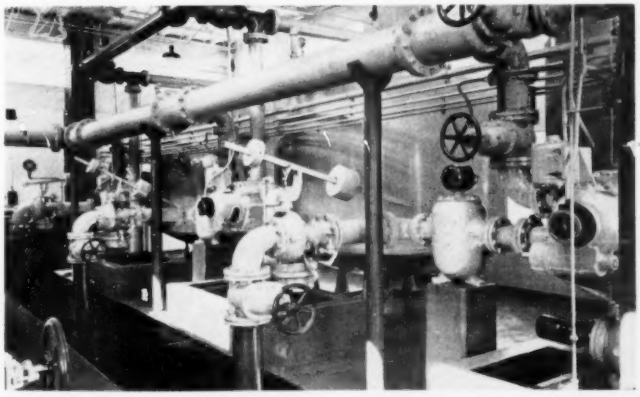
**C. E. WRIGHT**

Photos courtesy Permutit Co. and Chicago Bridge & Iron Co.

IN remodeling and enlarging its water plant, bringing it up to a capacity of 2,000,000 gal. a day, the City of New Smyrna Beach, Florida, has utilized an existing well as a source of brine required in regeneration of its new zeolite softening units. According to the Engineers, Russell & Axon of St. Louis, Mo., and Daytona Beach, Fla., this is one of the few instances where the brine used in this process is obtained from a well. In a somewhat similar installation recently at Jacksonville Beach, Florida, salt water from the ocean is being used for this purpose.

● **THIS is the attractive and modern building housing the New Smyrna Beach Water Plant. An existing salt well furnishes the brine needed for the softening process.**

Although the present average daily water consumption of New Smyrna Beach (a city of about 6,000 all-year residents) is only 800,000 gal. a day, provisions have been made for future growth, for peak loads that occur during the influx of summer and winter vacationists and for the extensive lawn sprinkling that is experienced here as in other Florida communities during the dry months. Another reason for increasing the capacity of the plant beyond that of any immediate requirements is that the city has only within the past few years begun to experience the growth that has marked other Florida communities, particularly those along the Atlantic Ocean and the Gulf. The growth of this community from 1940 to 1950 was only about 30 per cent, whereas the state as a whole gained 46 per cent in population and many communities went far above the state average.



● **THREE fully automatic Permutit water softeners have a capacity of 2 MGD. They are designed for the downflow method and employ a high capacity synthetic zeolite.**

### *Deep Well Supply*

All of the water supply for New Smyrna Beach is obtained from 200-ft. deep wells. To start with, the old system had two 12-in. and four 6-in. wells to which a new 10-in. well was added, and the 6-in. wells were put on the standby list. The well field is located four miles west of the Hillsborough River, which is brackish, and approximately 6 miles from the Atlantic Ocean, so there has been no trouble with salt water intrusion. The brine well, which is located at the plant site, is 12-in. diameter and is sunk to a depth of more than 1200 ft.

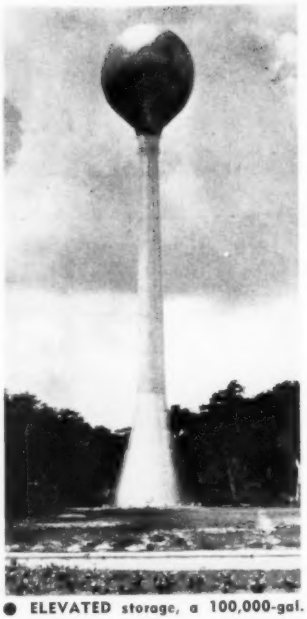
Water from the fresh water wells is pumped by Layne-Atlantic deep well turbine pumps which were part of the old system, and a new Berkeley pump installed in the new 10-in. well, through a 16-in. main to the plant. The first step in treatment of the water is aeration for the removal of hydrogen sulphide. After this, it is settled in a reservoir of 87,000 gals. capacity, from which it is pumped by three 650-gpm.

Yeomans centrifugal pumps through the softening units which discharge to a new treated water reservoir. The new reservoir has a capacity of 500,000 gals.; it is a circular, reinforced concrete, structure 95 ft. inside diameter and 10 ft. water depth. It is supported on concrete piles.

From this new reservoir, the water is pumped by three new high-service Yeomans pumps to the distribution system. Two of these pumps—one of 350-gpm capacity and the other 750-gpm capacity—are electric-motor driven; the third pump which has a capacity of 1200-gpm. has a dual drive, electric and gasoline engine. These three pumps are controlled by the water level in the Watersphere. This elevated storage tank, which has a capacity of 100,000 gals. and is supported by a steel pedestal 125 ft. high, was constructed by the Chicago Bridge and Iron Company.

The three Permutit zeolite softening units have a total capacity to deliver 2,000,000 gallons of water daily and are completely automatic in operation.. The units are designed for the downflow method of softening and employ a high capacity synthetic zeolite sold under the name of Permutit Q. Each unit has a capacity of softening approximately 117,000 gallons between regeneration. Hardness of the delivered water is about 4 gpg.

The brine used in regeneration is pumped from the salt water well by two centrifugal pumps, then aerated and stored in a 103,000-gallon reservoir which formerly was used for treated water storage. Two automatically controlled centrifugal brine transfer pumps then transfer the brine from this reservoir to the softeners as needed.



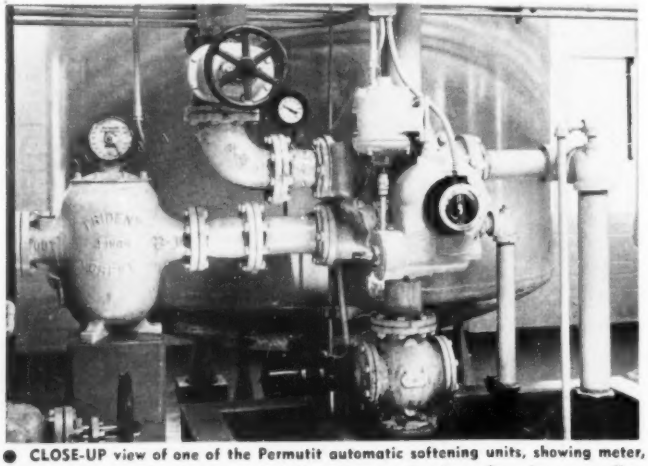
● **ELEVATED storage, a 100,000-gal. Watersphere, is 100 ft. to bottom.**

Chlorination of the water is accomplished with Wallace & Tiernan equipment and is the final treatment before the water passes into the distribution system.

The softening units, raw water transfer, high-service pumps and chlorinating equipment are housed in a one-story masonry building 46 by 61 ft. Space is provided in the same building for chemical storage, office and laboratory.

In addition to constructing the new water treatment plant at a cost of $290,000, New Smyrna Beach has also installed new distribution mains costing $163,000, including an 8-inch subaqueous line to the beach. The water project was engineered by Russell and Axon, with J. F. Kapinos, Engineer in Charge. Construction work, other than the elevated storage tank, was done by James H. Small Company, Jacksonville. Water mains were laid by E. N. Murray, Buena Vista, Georgia.

Expansion and modernization of the water plant was part of a larger project, including extensive improvement of the electric light plant, distribution system, and a new street lighting system in the business district, for which a bond issue of $1,400,000 was approved by the voters. The new electric power plant was engineered by Reynolds, Smith & Hills, Jacksonville, Fla., and the entire project was carried out under the direction of John C. Ferris, City Manager for the commission form of government.



● **CLOSE-UP view of one of the Permutit automatic softening units, showing meter, gauges and controls. Hardness of delivered water is about 4 grains per gallon.**

• • •

## Pipeline Network Analyzer Saves Slide-Rule Work

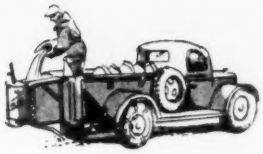
A McIlroy pipeline network analyzer, one of three such devices in the United States, has been installed by the Midwest Research Institute, Kansas City, Mo. An answer to a specific problem can be obtained in about half an hour. An electrical control board is used to duplicate an actual supply network, which can be composed of as many as 99 different lines; and source, rate of flow, pressure and other elements entering into the calculation can be set in accordance with actual conditions.

• • •

## To Convert Garbage into Animal Feed

It is proposed by Omaha, Nebr., to convert its garbage into animal feed by a local plant which produces alcohol. It is expected that the process will be more costly than the returns that can be obtained from the sale of the processed food. It is reported that the city will pay the plant about $2500 per month for converting the garbage into feed, but this is not expected to cover all of the costs.

# HOW we save MONEY on SNOW & ICE CONTROL



**ALBERT E. STANTON,**

**Street Commissioner, Oil City, Pa.**

IN the days when Grandpa blocked up his automobile for the winter, there was so little street traffic that it probably made no difference whether cinders or ashes, or nothing at all, was used on the streets. Now we consider snow and ice control as important as fire-fighting and it is realized that the old cinder methods are no good for modern needs; a little more snow after the cinders have been spread and they are covered up; and even when they are exposed, they give inadequate traction.

In contrast to cinders, rock salt has proved to be far more effective for snow and ice control for us in Oil City. And our old fear of rust attack by the salt has disappeared because we now add the rust inhibitor Banox to the rock salt. The use of this mixture of rock salt and Banox has done much to simplify our snow and ice removal problems and to promote safe winter use of the streets. Also, the cost of snow and ice removal has been reduced substantially, according to our records. We are now using this method for the fourth consecutive year and we are all pleased with it.

During the winter months a skeleton crew in the street department is on duty or on call 24 hours a day, and these men get on the job quickly in case of a snowfall or a freezing rain. We are on the edge of the Allegheny National Forest, which some people call the "Deep Freeze" of Pennsylvania, and winter brings frequent snow and ice conditions. When necessary, we put our entire street force of 22 men on snow-removal work; and we may even hire four or five extra men temporarily in an emergency.

Our equipment includes three snow plows, a snow blower, a bulldozer and grader, seven trucks and two "Scotchman" spreaders with Banox dispensers. Main thoroughfares and bus routes are treated first, after which our crews move into the other streets. We use the salt-and-Banox combination to melt away shallower snows and ice on about 20 miles of our 35 miles of streets. When the snowfall is deeper than 5 inches, we bring the snow plows and other removal equipment into action. In down-town areas, deep snow is removed and dumped into nearby Oil Creek.

● **PRINCIPAL streets are quickly cleared of snow and ice by application of salt and rust inhibitor. Special dispenser adds inhibitor to salt in correct proportion.**

Use of a dispenser on each of the Tarrant salt spreaders has eliminated the need for manual mixing of the inhibitor with the salt. The inhibitor is added semi-automatically at the rate of one pound to each 100 pounds of salt as it is spread on the street. The inhibited salt is especially useful in loosening packed snow-ice formations. The salt bores quickly through this layer and forms a brine that loosens the bond between the ice and the pavement. This permits breaking up by traffic or, if the snow is deep, with a grader or dozer blade, without injury to the pavement beneath.

● **ON THE job early with a Tarco salt spreader and inhibitor dispenser.**

Our experience here in Oil City has been that ice and snow control with a salt-plus-Banox mixture costs about one third as much as cindering, if you are thoroughly honest about the direct and indirect costs of cindering. Because of their bulk, cinders take about five times the truck-miles to use; the work is far slower at a time when you really need speed; and a great deal more labor is involved. In a continuing storm, you must keep on spreading cinders because the ones spread first are soon covered over. Where salt residues wash away with spring rains, leaving no dirt accumulations to be removed manually, cindering means that you have a major clean-up on your hands when spring arrives—streets, gutters, catch basins and sewers.

# STREET LIGHTING

ADEQUATE street lighting has many beneficial effects. It not only lowers the rate of night traffic accidents, but it also strongly affects pedestrian accidents and reduces the incidence of crime. For instance, experience has shown that there is a decrease in night traffic accidents, as illumination is increased, until an illumination value of about 1.0 footcandle is attained. This decrease is illustrated in Fig. 1 which shows the ratio of night to day fatalities when various values of lighting are provided.

In planning street lighting, consideration must be given to the nature and usage of the street, the background and the reflectance of the street surface, since all of these affect street lighting design. The amount of pedestrian and vehicular traffic also influence the amount of lighting required. For the purposes of street lighting design, pedestrian traffic may be rated as light, as on average residential streets; medium, as on secondary streets; and heavy, as on main business streets. For the same purposes, vehicular traffic may be classified, on the basis of maximum night hour movement of vehicles in both directions, into light traffic of less than 500 vehicles; medium traffic of 500 to 1,200 vehicles; and heavy traffic of over 1,200 vehicles.

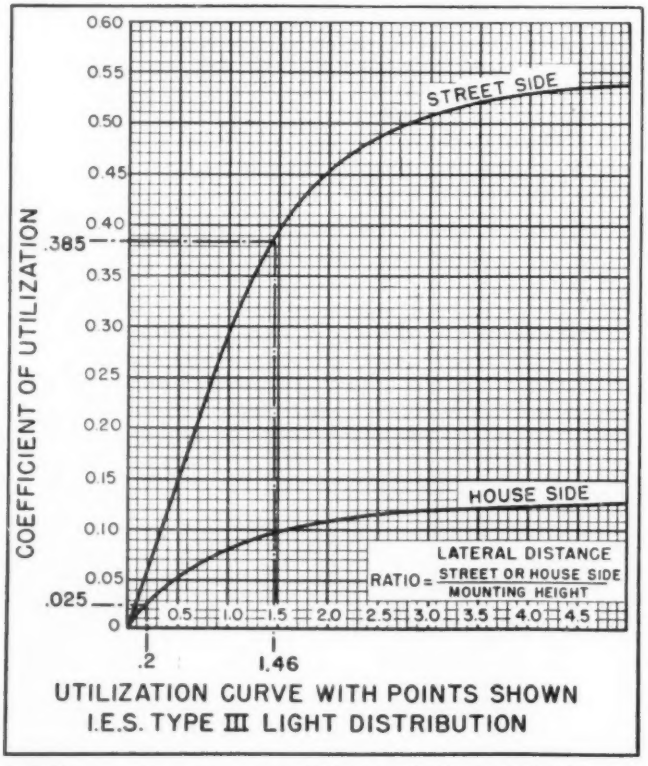
**Table 1—Recommended Average Horizontal Footcandles for Pavements Having 3 Per Cent Surface Reflectance**

| Pedestrian Traffic | Vehicular Traffic | | | |
|---|---|---|---|---|
| | *Very Light* | *Light* | *Medium* | *Heavy* |
| Heavy | 0.9 fc | 1.2 fc | 1.5 fc | 1.8 fc |
| Medium | 0.6 fc | 0.9 fc | 1.2 fc | 1.5 fc |
| Light | 0.3 fc | 0.6 fc | 0.9 fc | 1.2 fc |

These classifications provide the primary basis for street lighting design, as indicated in Table 1, which shows the lighting required for various traffic conditions for streets having a reflectance factor of 3 per cent, such as with black asphalt surface. Where reflectance factors are higher, a lower light intensity is required. With a street having a reflectance factor of 10 per cent, as brick or light stone surfaced bituminous, the required values are about two-thirds of those shown in Table 1; and where the reflectance factor is 20 per cent, as with clean light concrete, the required footcandles will be about 55 per cent of those shown.

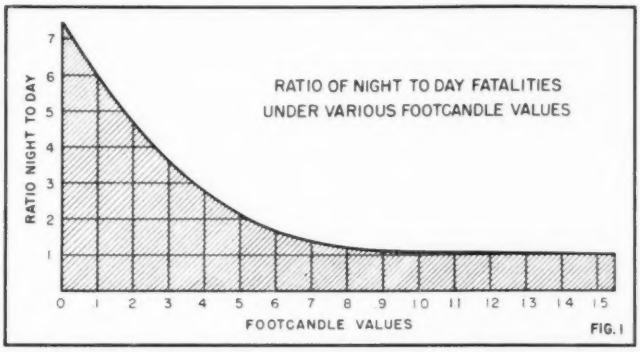
In using Table 1 as a basis for design, several factors should be considered: (1) The lowest footcandle value at any point on the pavement, except on very light traffic streets, should be not less than one-fourth the value shown in the Table. (2) The installation should be designed with a "maintenance factor" based on the probable provision of maintenance, repair and upkeep, so that the average service illumination will not fall below the values shown. (3) Where it is necessary to be able to see the individual nature of objects projected against a background of moving traffic, higher levels and greater uniformity of lighting are required.

Proper distribution of the light from the luminaires is one of the essential factors in efficient roadway




● **THIS curve, Fig. 2, gives the coefficient of utilization for both sides of the street. Method of use and substitution in Formula 1 are explained on page 68.**

# ENGINEERING




● **NIGHT traffic fatalities increase rapidly when street lighting is deficient. This curve, Fig. 1, show the ratio when various intensities of lighting are used.**

lighting. Light emanating from the luminaires can be directionally controlled and proportioned in accordance with the visibility and seeing requirements. Light distribution is affected by mounting height, overhead or transverse location, longitudinal spacing, roadway width and other less important factors.

Luminaires are available which are designed to meet most normal conditions, including those for two-way lateral distribution and for 4-way concentrations for use at intersections. The type of luminaire to be used depends on street width and mounting height. Spacing, mounting height and overlap depend on local conditions. On a residential street, spacing may be such that the main light beams barely meet between units; for a business street, where uniformity of illumination is important, it may be desirable to close the spacing to provide 50 per cent to 100 per cent overlap of beams.

There is a choice in selecting the light source among the standard filament lamp, the mercury vapor, the sodium vapor and the fluorescent. The filament lamp permits excellent control with simple optical systems, operation is easy and the wattage range is wide. The mercury vapor lamp generates about twice as much light as does the filament lamp of comparable wattage and has a much longer life. The bluish white color that is produced modifies some colors but may enhance the appearance of streets having heavy vegetation. The sodium vapor source produces a warm yellow light, but it has no substantial advantage over the filament or mercury vapor light source. Because it distorts complexions, it may be undesirable where there is much pedestrian traffic. It is more desirable for isolated lighting, grade crossings and special traffic control locations. Fluorescent lights give high efficiency of generation, low brightness, relatively long life and enhanced visibility on wet pavements, but require larger luminaires and protection in cold weather; and they have a low output per foot of source.

***The data in this article are based on an 83-page booklet "Street Lighting Engineering Guide" recently published by Westinghouse Electric Corp. Lighting Division.***

### *Computing Roadway Illumination*

The average footcandles required to provide adequate street lighting depends on the lamp lumens, the maintenance factor, the coefficient of utilization, the lamp spacing and the roadway width.

The maintenance factor may include luminaire maintenance; lamp depreciation, replacement and maintenance; and other conditions which affect the footcandles actually maintained in service. The maintained illumination value may ordinarily be assumed at 70 per cent of the lamp lumens provided if lamps are replaced on a group replacement plan; the mean lumen value may be used when lamps are replaced individually as they burn out; initial lumen value is used to determine footcandle requirements.

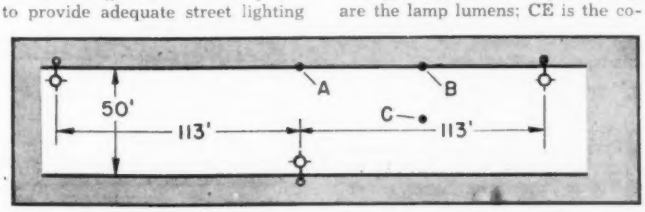
The coefficient of utilization depends on street width, overhang and mounting height. The value for various conditions are shown in Fig. 2.

Luminaires may be placed on one side of the street, but the preferred arrangement is to stagger them on opposite sides; or they may be placed in pairs opposite each other. When opposite each other, one-half of the actual spacing distance is used in computing the average footcandles required.

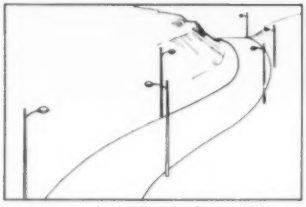
Formula 1 combines the factors listed above in an equation showing average initial footcandle requirements.

$$Fc = \frac{LL \times CE \times MF}{S \times RW} \quad \ldots 1$$

In this equation, Fc represents the average footcandles required; LL are the lamp lumens; CE is the co-




● **FIG. 3 shows the points to be checked along the street to determine light value.**



● **HOW to light a curve and hill section of street most effectively.**

efficient of utilization from Fig. 2 based on the ratio of mounting height to lateral distance to the curb; MF is the maintenance factor; S is the spacing between luminaires in feet; and RW is roadway width. The formula may be used for initial or maintained values. If initial lamp lumens are used with MF = O, the illumination would be initial. If the value of MF is sufficient to cover lamp and luminaire depreciation, the illumination would be in-service value.

Lamp spacing or required lamp lumens can be determined from this formula by transposition, the other factors being known or assumed.

The procedure is as follows for computing the average footcandles required for a combination business and traffic street, having medium vehicular and heavy pedestrian traffic and other characteristics as stated: (1) Roadway width, curb to curb, 50 ft.; (2) luminaire mounting height 30 ft.; (3) luminaire overhang 6 ft.; (4) lamps 6.6 ampere, 10,000 lumens; (5) unit spacing, opposite arrangement, 115 ft.; and (6) street reflectance 10%. The maintenance factor is omitted because it is desired to find the initial value with both lamps and luminaires new and clean.

From Fig. 2, the coefficient of utilization is found as follows: for the street side, the street width less overhang, 50-6, is divided by the mounting height, 30 ft., giving a value of 1.46. The coefficient of utilization form Fig. 2 is shown to be 0.385. For the house side, the overhang distance, 6 ft., is divided by the mounting height, giving a value of 0.20, for which the coefficient of utilization is 0.025. The sum of the two is 0.410. Substituting the various factors in Formula 1:

$$FC = \frac{10{,}000 \times 0.41}{115 \times 0.5 \times 50} = 1.426$$

which is the average footcandles required. This value must be reduced by a luminaire depreciation factor of 0.80 and by a mean lumen depreciation value for this particular lamp which may be assumed at 94.3 per cent, bringing the average footcandles maintained in service at 1.065.

Formula 1 may be used to determine luminaire spacing. Assuming a curb to curb width of roadway of 50 ft.; a mounting height of 30 ft.; a luminaire overhang of 6 ft.; lamps with 10,000 lumens initially; group replacement of lamps; and a luminaire maintenance factor of 90 per cent, a staggered spacing to provide an average illumination of 0.6 footcandle is determined from Formula 1. At 70% of rated life, the 10,000 lumen lamps are estimated to have an average value of 9,250 lumens; the coefficient of utilization will be as in the previous example. Spacing will be:

$$S = \frac{9{,}250 \times 0.41 \times 0.90}{0.6 \times 50} = 113 \text{ ft.}$$

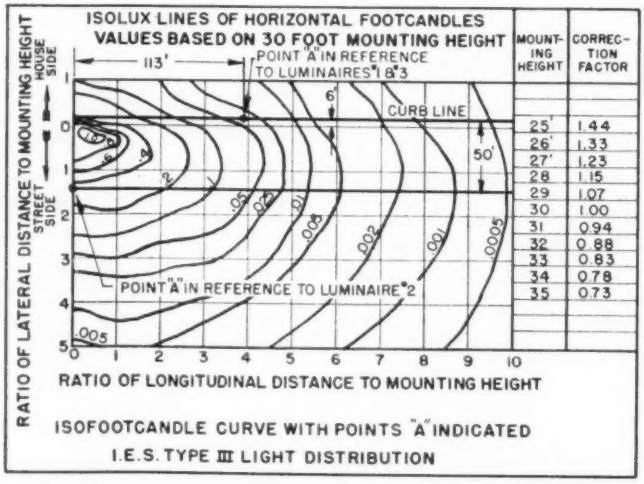
Fig. 3 shows the position of the lights. The points A, B and C indicate positions where minimum illumination may occur. The following procedures are used to determine if the requirement that the minimum value provided is not less than one-fourth of the average, and to show how much lighting luminaires 1, 2 and 3 contribute. From Fig. 4 it will be noted that point A will receive 0.04 footcandle from luminaire No. 1, the same from No. 3, and 0.32 footcandle from No. 2. The total illumination at point A will be the total of the three, or 0.40 footcandle. This will be reduced by a lamp depreciation factor of 0.90 and an assumed luminaire dirt depreciation factor of 0.90, making a total illumination of 0.33 footcandle on Point A. Since this is more than one-fourth of the average, it is satisfactory. The same procedure can be used to check the other points. If any should fall below one-fourth of the average, it indicates that luminaire spacing is too great, the mounting height too low, the light distribution type is incorrect, or some combination of two or more of these defects exist.

### *Evaluating Lighting Results*

The accepted method of evaluating roadway illumination mechanically is by recording the footcandles on the street surface. The reliability of the results obtained will depend on the experience of the observer, the accuracy of the instrument used and the location and number of test stations. A MacBeth illuminometer, accurately adjusted, will yield results, with an untrained observer, of an accuracy of ±15%; with a trained observer ±10%; and with a trained observer and a cosine corrected test plate ±5%. A photoelectric footcandle meter with a self-leveling cosine-corrected photo-voltaic cell as a primary detector, is accurate to ±5% with the average untrained observer.

The IES Committee on Testing Procedure has prepared a guide for measuring illumination provided by street lighting installations. If the specific rules in this guide are followed carefully, an acceptable degree of accuracy will be insured.

(*Continued on page* 112)




● **FIG. 4 shows isolux lines of horizontal footcandles based on a mounting height of 30 ft. for the luminaire. Point "A" referred to in text is shown at left.**

# HOW ENZYMES IMPROVED SLUDGE DIGESTION

**A. C. BRYAN,**
**Superintendent of Sewage Treatment, Houston, Texas**

MAY it not be possible to relieve an overloaded sewage treatment plant by adding commercially produced bacteria and enzymes to offset a deficiency of naturally produced bacteria and enzymes? And, if so, can it be done within economically feasible limits?

The search for the answer to these last two questions as being pursued by the Sewer Division of the Department of Public Works of the City of Houston, Texas, is the subject of this report.

Houston's interest in these questions is pointed up by the fact that it is required to operate a number of small treatment plants on the periphery of the City that are scheduled for abandonment as soon as interceptor sewers can be extended to transport the sewage to one of the larger plants for more economical and desirable treatment. The two large activated sludge plants, Sims Bayou and North Side, with a combined capacity of 50 mgd, treat approximately 90% of the total sewage treated. The remaining 10% is treated at eleven small plants ranging in size from 20,000 to 2 million gallons daily. Several of these small plants are severely overloaded, yet, being scheduled for early interception, enlargements to these particular plants cannot be economically justified. The City selected one such plant, Oak Forest, for a study of the benefits, if any, derived from adding commercially produced bacteria and enzymes to a badly overloaded digester.

For the purposes of this study a working arrangement was reached with the licensee of a biological product marketed under the trade name of "Bionetic." Under this arrangement the manufacturer selected the type of Bionetic, established the rate and manner of feeding, and furnished other technical guidance throughout the period of observation. The City Sewer Division established the operating procedures and performed all analytical tests including sampling.

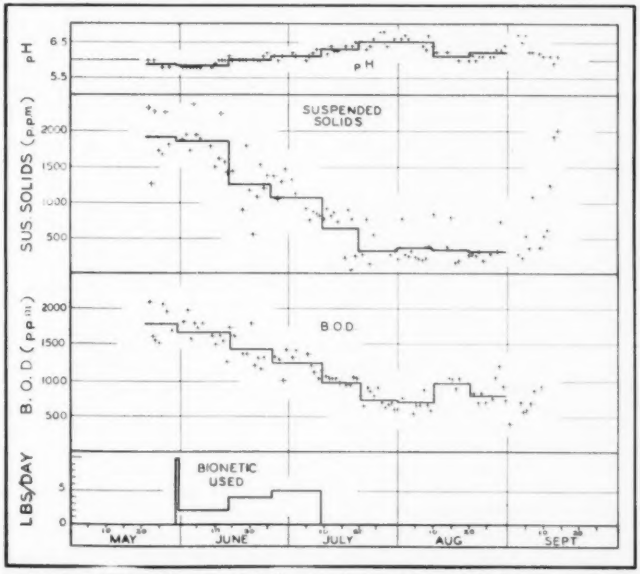
According to the manufacturer's description: "Bionetic is a dry, stable powder of groups of preserved living micro-organisms from natural sources, with enzyme systems and trace minerals. . ." They describe Type No. 1, which was used in this application, as being, "for digesters, consisting of preserved living cultures of select anaerobic organisms, activating factors from mould sources, potent aerobic digesting organisms, together with enzyme systems and other undefined bio-catalysts".

The Oak Forest sewage treatment plant employs the Hays Process of contact aeration. It was constructed in 1946 by a real estate development firm and in 1949 was acquired by the City under an extensive annexation program. The plant was originally designed for a population of 4,000 but is now serving a residential population of approximately 12,000.

The digester at this plant is a circular, fixed cover, reinforced concrete tank with hopper bottom having a capacity of 3 cubic feet per capita on design basis, which amounts to 1 cubic foot per capita under present operating conditions. Relief for this digester was the main objective of this particular investigation.

### *Measures of Performance*

This plant lacked facilities for gas production measurement as well as some of the other facilities convenient for measuring digester performance, so it was concluded, for




● **PERFORMANCE** of overloaded digester during test period when enzymes were added. Curves show pH changes, and suspended solids and BOD of supernatant.

the purposes of this study, to use "supernatant quality" as a measure of digester performance. This seemed particularly desirable since all digester supernatant is returned to the primary tanks where it has imposed a significant load on the primary and secondary treatment facilities. Therefore, starting two weeks prior to the addition of Bionetic and continuously thereafter, daily samples of supernatant were collected by compositing from portions collected at each sludge drawing when sludge was pumped to the digester. This daily composite sample of supernatant was then analyzed for 5-day BOD, suspended solids and pH.

For the period May 17 through May 30 the BOD averaged 1782 ppm, the suspended solids averaged 1908 ppm; and the pH averaged 5.9. These values indicate the normal quality of the supernatant prior to the addition of Bionetic.

On May 30 a 10-pound slug of Bionetic was introduced into the digester and from May 31 through June 13 Bionetic was added at the rate of 2 pounds per day. On June 14 the rate of feed was increased to 4 pounds per day, continuing through June 25. From June 26 through July 9 the material was fed at the rate of 5 pounds per day. After this time all feeding was discontinued to observe the residual effect of the material that had been added.

The feeding of the material was accomplished by dividing the total quantity for the day into 4 equal portions. One portion was added at each of the 4 routine daily sludge drawings just prior to pumping the thickened sludge to the digester.

The average supernatant quality during the period of 2 pounds per day feed was only slightly better than that prior to addition of Bionetic. However, examination of the daily values indicate a definite improvement trend after the first week of feeding. This improvement trend, as measured by decreasing BOD and suspended solids and increasing pH continued at a very substantial rate throughout the remainder of the feeding period with continued improvement still showing for about 3 weeks after all feeding was stopped. The BOD dropped to an average of 719 ppm from an original 1782 ppm; the suspended solids to 328 ppm from an original 1908 ppm; and pH increased to 6.5 from an original 5.9.

Although pH and BOD did not remain quite so stable at the improved values, the suspended solids remained at the approximate low average for substantially two months after discontinuing the Bionetic treatment.

### *Summary of Values*

Summarizing the above outlined treatment and results: a total of 200 pounds of Bionetic was added to the digester over a period of 40 days with the result that the supernatant was greatly improved during the 40-day period and the improvement continued to exist for an additional 60 days after the treatment was stopped. Assuming the Bionetic material to cost $3.00 per pound, the average cost per day for the total 100-day improved period was $6.00 per day. For this $6.00 per day during the 100-day period, suspended solids were reduced from 1908 ppm to a 100-day average of 897; BOD from 1782 ppm to a 100-day average of 1051; and pH increased from 5.9 to 100-day average of 6.2.

It is to be noted that the above cost-versus-improvement statistics include the "improving" or "seeding" period of about 40 days. It is entirely possible that, once the quality has been improved, it could be held at the improved level at a lesser cost per day. Also, while it has not been statistically proven, it is felt by those that have had a part in this investigation that probably equal results could have been obtained without so great an increase in feed rates. A much longer period of observation is obviously needed for an establishment of optimum circumstances.

Another significant observation recorded in connection with this particular study was the definite decrease in quantity of sludge drawn to drying beds. Prior to the start of this experiment, the operators were forced to draw 2 beds (approximately 3750 gallons) of sludge each seven days in order to keep the supernatant within the very poor quality condition prevailing prior to the start of the experiment. The sludge was green and offensive and dewatered poorly. As the feeding of Bionetic progressed there was a decided decrease in the quantity of sludge available for drawing, leveling off at less than 50% of amounts previously drawn. This is an important factor where deficiency of drying beds exists or where laborer's time for removal of sludge must be considered. It was observed that this reduced quantity of sludge was still a rather green sludge and contained a considerable quantity of corn grains and other coarse solids undigested. However, the quality of the sludge was at least equal to, and possibly better than, the sludge prior to Bionetic treatment.

The documented evidence resulting from this reported experience indicates that the biological industry may be able to provide the sewage and waste treatment fields with some very valuable tools, particularly for emergency use. The expected results from, and costs of, biological additives are still not well established, but a cautious appraisal of possible benefits is justified.

The City of Houston Sewer Division is currently carrying on investigations of possible advantages to be obtained from aerobic materials at other plants in the city. These materials are being fed into the aerobic processes of treatment, but as yet the results are not available for reporting.

The Sewer Division of the City of Houston, in charge of Chief Engineer Wm. E. White, is under the direction of J. M. Nagle, Director, Department of Public Works. Acknowledgments are due George Bartow, Sewage Plant Operator; R. E. Cleland, Chemist, and his staff; and to A. J. Krell of Reliance Chemicals Corporation, Houston, Texas (licensee for Bionetics) for their assistance in the assembling of this material. The Reliance Chemicals Corporation has an exclusive license under the George A. Jeffreys Co. patents for the use and sale of Bionetics in the treatment of Sewage and Industrial Wastes.

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### Metal Pipe Relined with Plastic

More than 600 ft. of 2-inch Tenite plastic piping was used to reline a combination 3-inch and 4-inch metal line. The old section was opened, flushed to remove scale and other material and the new line floated in. With a cork in the end of the Tenite liner, called Kraloy, it was necessary only to turn water into the old line to carry the liner pipe through. Dresser joints were used at the ends to connect to metal service lines. The entire job took 2½ hours, with two men most of the time and two others helping part time.

# New Water Plant

## REHABILITATES A TOWN

**J. L. MORRISON,**
**UNC School of Journalism,**
**Chapel Hill, N. C.**

THE little town of Graham, N. C., has a population of only 6,000 and has never caused much of a stir, but Grahamites are finding that their new water filtration plant —the first the town has ever had— bids fair to put their town on the map. "It's about time we stepped into the 20th century," is typical of townspeople's reaction to Graham's new plant which supplanted six deep wells, all of which were gradually failing. One of the deepest, in fact, was supplying only 40 gpm, and at that rate was proving itself the poorest sort of investment.

A case history might very well be drawn from the impact of a new water plant on a small town, using Graham as an example. Down the years, for instance, it had proved impossible for Graham to attract industry within its borders and the chief reason for such industrial reluctance was lack of an ample water supply. In two well-documented instances, two separate textile finishing plants failed to establish in Graham for that reason. This continued by-passing of Graham for other nearby towns in Piedmont Carolina resulted in poor morale in the business community and a decided tendency in Graham's young people to migrate elsewhere in search of opportunity. All this despite the fact that the town is located in the very heart of the fastest-growing industrial section of the state.

Today, only months after Graham's new water plant started operating, the town already has made a promising start in its quest for new business. Burlington Engineering Co. has set up a display showroom in Graham, something which would have been impossible before since the firm needed a 3-inch water connection for proper operation of all the new textile machines it demonstrates. With textile mill purchasing agents flocking into Graham to inspect such machinery, the Graham town fathers have some reason to believe that textile mills will come to town too.

● **HERE IS the exterior of the new $320,000 water plant for Graham.**

One textile mill, in fact, is already considering buying the surplus water of Graham, a town which never before had a surplus but rather a chronic shortage each summer. Cone Mills plant in nearby Haw River, N. C., is negotiating with Graham for a water supply which would be more reliable than the mill's own system of outdated deep wells. Fluctuations of water pressure from Graham's small plant may finally operate against such an agreement, but it is symptomatic of the deep-seated change that has come over Graham now that such a transaction is even given consideration.

### *Less for Fire Insurance*

Another spectacular turn-about in Graham's status is in the fact of its being able to sell surplus water instead of having to buy another municipality's surplus. According to Plant Superintendent, J. F. Thompson, Jr., Graham's water bill, through having to buy water from the nearby City of Burlington, came to about $800 per month, a figure which increased to $1200 a month shortly before the new plant went into operation. But in the fall of 1951, after having to buy water from Burlington for about six weeks, Grahamites took keen enjoyment in being able to sell water right back to Burlington during a dry spell of another six weeks and in a quantity of about 350,000 gpd.

Fire protection is still another of the revolutionary changes which has come over Graham in recent months. Many householders living beyond the reach of the old facilities have experienced good-sized cuts in their fire insurance premiums now that the town has installed $55,000 worth of extensions. Added fire protection for the center of town has been forthcoming, too, in the form of an 8-inch by-pass main feeding directly into the heart of town and providing far greater water pressure than ever was dreamed of before. Nor has Graham ever had a recognizable recreation program, something which the people need, and which could be built around a swimming pool. That, in the light of Graham's recurrent water shortages, never even got into the talking stage before.

Graham's old system of six deep wells "just grew" like Topsy, without rhyme, reason or planning. The town started with two, then added three more and finally leased another from Burlington Mills Corp. For at least 10 years prior to the construction of the new filtration plant the daily discharge from the town wells was dropping gradually until the townspeople took alarm, passed a bond issue referendum and issued $300,000 worth of town bonds. When built, the plant's cost actually came to some $320,000.

Such a milestone in the town's history could not be suffered to pass unnoticed, and so in the interest of good public relations the town fathers organized a grand opening for the new plant on June 22, 1952. As it happened that was a scorching hot day, but hundreds of people swarmed all over the new

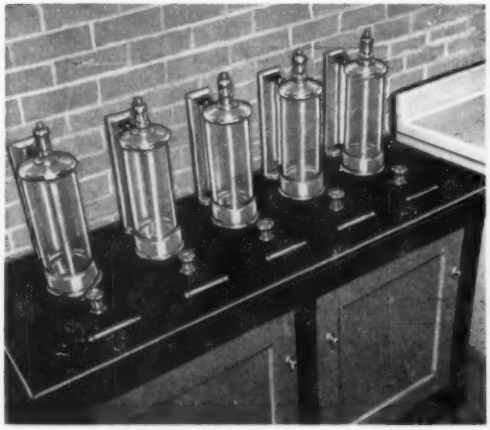
plant with a grateful sense of participation. They were escorted through the plant by Plant Superintendent J. F. Thompson, Jr., Water Superintendent J. F. Thompson, Mayor John Crawford and members of the Board of Town Commissioners. Operation of the plant was explained and the process detailed whereby raw water pumped from the nearby reservoir on Back Creek, a tributary of the Haw River, was filtered, purified and pumped into storage tanks in Graham. The "open house" was a well-advertised success, complete with congratulatory bouquets of flowers and local merchants gleefully doling out free soft drinks and ice cream.

One of the most popular eye-catchers at the "open house" was the sample table in the plant laboratory where visitors inspected actual samples of raw, mixed, settled, filtered and finished water in a piece of apparatus which is fairly rare in such small plants. Another item of interest, and one of the first in small plants in this section, was the Simplex rate-of-flow controller on the wash water line, one on each of the effluent lines.

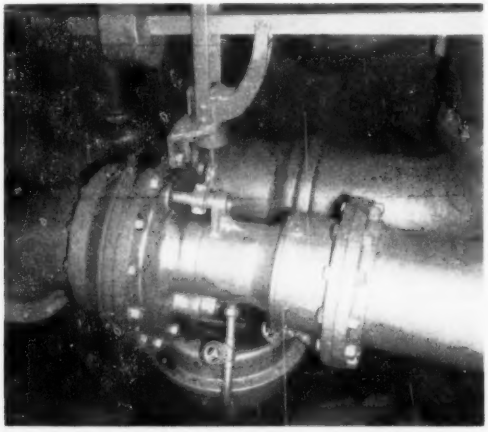
With a rated capacity of 1 million gallons per day, the Graham plant easily can supply the town's present demand of an average consumption of 0.5 mgd with a peak summer load of 800,000 gallons per day. The plant is constructed, too, so that it may be expanded with no trouble, all equipment being properly teed-off and the building itself similarly prepared.

All pumps at the new Graham plant are by American Well Works and include two raw water pumps, one of 750-gpm and the other of 350-gpm, both of the vertical turbine type; two finished water pumps, one 50-hp 350-gpm and the other 125-hp 700-gpm, both of the horizontal turbine type; and one 50-hp wash water pump, the rated capacity of which is 3400-gpm.

Filters and equipment were installed by Roberts Filter Co., filter equipment being of the baffle type mixing chamber with settling basin. Filter sweeps are not yet part of the plant's equipment, but town officials are hoping to acquire these when additional funds become available. Meters, gauges and controllers are all by Simplex Valve and Meter Co.; and the chlorinators and chemical feed machines are by Wallace & Tiernan. Consulting engineer for the project was the firm of Linberg Engineers of Burlington.



● **SAMPLE TABLE at filter plant was feature of "open house" and showed raw, settled, filtered and finished water to guests.**



● **RATE CONTROLLERS by Simplex were installed on effluent lines from each filter to insure full control of operation.**

## Financial Mathematics of Water Main Extensions

Per residential consumer, the average revenue of the Birmingham (Ala.) Water Works is $16.95, according to W. H. H. Putnam, General Manager, in a paper before the Alabama Water and Sewage Association. Operating expenses are just about 50 per cent, or $8.47, leaving $8.48 available for interest and principal on bonds and for other similar purposes. Of the overall cost of the water works system, including dams, reservoirs, filters, shops, distribution mains and all other facilities, the distribution system represents 43 per cent. The income per consumer that is available to carry the investment in mains is, therefore 43 per cent of $8.48, or $3.65. The average interest and amortization charge on the water works properties is 4.22 per cent.

Dividing the $3.65 by 0.0422 gives $86.40, which is the amount that, on the average, can be invested soundly in water mains to obtain a consumer who will use water amounting to $16.95 per year. That is, it is possible to invest in water mains alone about five times the annual revenue that is expected.

In making extensions, a flat charge per foot is made, which is based on the average cost of installing all sizes of pipe. This charge has been fixed at $2.38 per foot. The use of this flat rate avoids argument as to whether a 2-inch, 4-inch, 6-inch or 8-inch main should be installed. The size and type of pipe is determined by the water works authorities, based on existing local conditions.

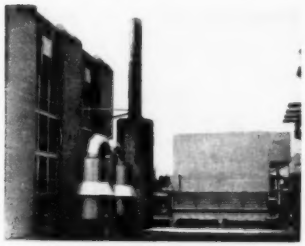
On the basis of this cost of $2.38 for the average foot of distribution main, the allowance of pipe per customer is indicated by dividing the $86.40 previously indicated by $2.38, the average cost per foot, which indicates about 36 ft. per customer.

In Birmingham, deposits are required to cover the cost of the main extension at the unit price of $2.38 per foot; and refunds are made to the depositors on the basis of the annual revenue received.

# DUAL FUEL CONVERSION CUTS POWER COST TO RECORD LOW

CONVERSION of a 2,000-hp. Fairbanks-Morse diesel to dual-fuel operation is saving the Weatherford, Texas, municipal power plant more than $16,000 a year. The converted unit has produced a kilowatt-hour at a total fuel cost as low as 2.49 mills and is averaging 2.73 mills. Compared with diesel fuel costs of 6.49 mills, even the higher dual-fuel figure represents a saving of 3.76 mills per kwh, a cost reduction of 58 percent.

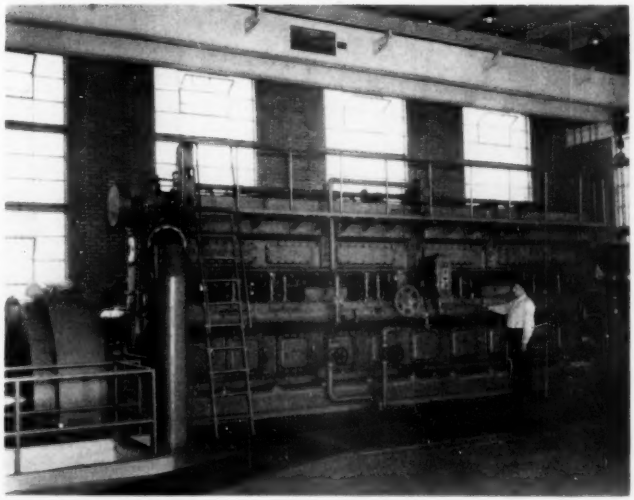
When the Weatherford municipal plant was put into operation in 1941, the cost of diesel fuel was 3.25 cents per gallon. Today, the same fuel costs 8.50 cents per gallon. With natural gas available at Weatherford for 20 cents per thousand cubic feet, one cent will buy about 54,000 Btu for natural gas and only 16,500



● **MAXIM silencer, American air filters and FM evaporative cooler are shown.**

Btu when diesel fuel is used. These figures led Conrad F. Russell, Utilities Manager, to take advantage of the cheaper fuel by converting the largest engine in the plant to dual fuel operation.

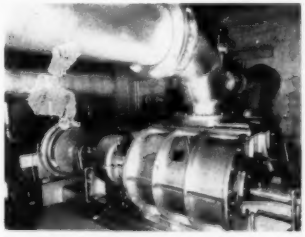
The month of December, 1951, demonstrated what could be achieved in fuel economy through use of the dual-fuel engine. During this month, the dual-fuel unit produced 361,000 kwh. and consumed fuel oil costing $199.75 and natural gas costing $699.19. This meant a cost per kwh. of 0.55 mill for pilot oil and 1.94 mills for gas, a total fuel



● **CHIEF ENGINEER Cooper inspects FM dual fuel engine; cost is 2.73 mills/kwh.**

cost of 2.49 mills. The oil-burning engines produced 211,081 kwh. and consumed fuel oil costing $1,371.14, a cost per kwh. of 6.49 mills.

Even before the advent of natural gas fuel, this was a successful plant with improvements in operating ef-



● **SCAVENGING air for FM engine is supplied by Roots-Connersville blower.**

ficiency quickly reflected in greater profits. The auditor's report of the 1950-51 fiscal year reveals that a profit of $85,666.71 was realized on gross power sales of $253,873.34. During this period the dual fuel operation was just getting underway. The single month of January, 1952, produced a net profit of $7916.55 on gross sales of $21,187.19 reflecting an increase in the percentage of profit.

The city power plant still is not adequate to meet the expanding needs of the rapidly growing community and so further plant expansion is planned. The management has been so pleased with the economy of the natural gas fired dual-fuel engines that an agreement has been made to acquire two 1600-hp. opposed-piston Fairbanks-Morse dual-fuel engines.

The attractive powerhouse serves as the electrical distribution center for the system. Each generator has a separate electrical panel and the main board has panels for each of the feeder circuits. Space has been provided in the existing building for the proposed expansion, and further expansion can be taken care of by extending the existing structure according to plan.

# INDUSTRIAL WASTES —A COMMUNITY PROBLEM

## The Effect of Certain Types of Wastes on City Utilities

**EDMUND B. BESSELIEVRE**

Mem. Amer. Soc. Civ. Engrs.,
Chief Sanitary Engineer,
International Sales,
The Dorr Company

PRACTICALLY every municipality has completed at public expense utilities which serve the public interest. These may comprise sewer systems and water distribution lines alone; or they may include complete works, with complex sewage or water treatment plants. Regardless of the nature or extent of these public services, many industrial wastes will have an effect, detrimental or otherwise, on them. Therefore, when an industry contemplates locating in a locality its wastes, before they are taken into the public systems, should be carefully examined and analyzed for their effect on the utilities.

The general attributes of industrial wastes which may affect the utilities are: (1) quality; (2) volume; and (3) location. The quality of a waste covers its general characteristics and the elements contained in it which may damage or otherwise adversely affect the system. This includes the presence of acids or other corrosive materials which may destroy the fabric of the sewer system. Concrete sewers are affected by acid wastes, whereas vitrified pipes are less subject to deterioration from the same source. Alkaline wastes may cause deposits in the lines which will impair their capacity for handling the volumetric loads imposed upon them. Here again the vitrified lines are less susceptible to attack. However, size is an element of consideration. Vitrified pipe lines are limited to the smaller sizes; and if concrete lines are not indicated due to the nature of the material to be handled, then the engineering department must consider other types of conductors with protective linings to offset the attacks of acids or alkalies. If this appears to be a serious matter, affecting many miles of pipe lines or causing the construction of new lines of this special nature, it is probably within reason to consider a requirement for pre-treatment at the source of those wastes which may cause such damage. While this may seem to be an added expense to the creator of the wastes, nevertheless public expediency frequently dictates that it is fairer for the one person creating a problem to solve it at his own expense than to cause the municipality to spend a large sum of money because of this one offender, and to put this burden upon the entire population. Careful study therefore, should be given to every waste which it is considered may go into the common sewer system, or its elements, before permission to admit is given.

### *Effect on Treatment*

Although the wastes may be of such a nature that they will not damage the sewers themselves, there is very frequently now and increasingly more common in the future, a sewage treatment plant at the termination of the system. This plant is normally designed to handle the domestic sewage of the city. Its design is usually not predicated on the inclusion of a large volume of industrial wastes. This is apt to become less true in the future, however, as more and more cities are recognizing the need for, or the possibility of, having to take care of industrial wastes in their public plants and are incorporating into their designs the necessary treatment devices, or are providing for the addition of such devices as the need develops. Certain types of industrial wastes may be handled in sewage treatment plants designed for the handling of normal municipal sewage if the principal constituent of these wastes is of the same nature as the components of municipal sewage for which the plants are designed; that is, a preponderance of organic matter which can be assimilated by the normal biological processes adopted in the sewage plants. True, the additional volume of organic matter may be troublesome but the additional solids handling units may remedy this at reasonable cost.

Such organic wastes will not normally upset the sometimes delicate functioning of the bacteria employed to stabilize the organic matter. In fact in some of the more modern methods, high rate filtration, for instance, the additional organic load may be readily taken care of on the same filters that are in the plant, if these are of the old slow rate type, by providing for the recirculation of the effluent of the filters back to the primary sedimentation units so that the organic matter is put into contact with the aerobic bacteria several times instead of once which was the original practice. It has been conclusively proven, in many hundreds of operating plants throughout the world, that a trickling filter designed for slow rate application, which would normally handle about 2 million gallons of sewage per acre per day, can, with recirculation, be made to handle up to 15 to 20

million gallons of sewage per acre per day. This higher rate, includes, of course, the recirculated flow but nevertheless, assuming the recirculation to be about twice the average daily flow of sewage to the plant, the rate of actual application will still be of the order of 5 to 7 mgad. Thus, the older plants, faced with the handling of new volumes of organic wastes may be remodeled at moderate expense, or even plants which now have high rate filters may be stepped up in capacity by increasing the rate of recirculation.

### *Effects of Solids on Plant*

The contribution of additional suspended solids to the normal flow in a sewer, accompanied by an increase in volume, does not normally cause trouble in a well designed plant, unless the load of solids and the volume are inordinately large. The screens provided as the first elements in a treatment plant, unless flooded out by extremely high flow volume, will still collect the screenable solids. The rakes of the screens may work more frequently and the operator may have to remove more loads of screenings per day, but otherwise the unit will still function. The grit chambers will collect more actual grit and less organic matter under higher loads than otherwise, as these units are usually designed on the basis of certain velocities for maximum flows, therefore, the closer the normal flow adheres to the designed maximum, the more of the desired size of inert grit will be collected and the less the proportion of organic solids will be. The closer the flow comes to the basis of design, the less trouble ensues.

Sedimentation tanks are normally designed to handle a given amount of flow on the average flow basis, that is the total estimated flow of a 24-hour day, divided by 12 to give a two-hour period of detention, or by 8 to give a 3-hour period of detention. It is expected that such a tank will remove, in the period selected, from 50 to 60 percent of the suspended solids. It is realized that during the peak flow periods of the day, when the rate may be as much as twice the average rate, the efficiency of the tank will decrease; but since these peak flow periods are of short duration, the general effect over the day will be to achieve the desired result in percentage of removal. Thus, a sedimentation tank designed on this basis of common engineering practice can handle an increase in flow without much trouble. Also, if the industrial wastes does add considerable suspended solids, but does not materially increase the volume of flow, the suspended material will settle out in the sedimentation units provided, with little or no additional trouble or cost.

Where the additional suspended solids loads do cause difficulty is in the solids handling elements of the plant. This begins with the capacity of the sludge collection equipment adequately to handle the additional load. However, in most well designed modern plants, where standard equipment is used, the capacity of the mechanism for collecting the sludge is ample, particularly if the solids are of the nature of municipal sludge which responds readily to the raking action of the sludge collection blades. The sludge pumps are the next item of

### *TABLE I.—EFFECT OF CERTAIN INDUSTRIAL WASTES ON SEWERAGE SYSTEMS*

| | Sewers | | Screens | Sedimentation | | Biological Units | | Digestion | Sludge Handling Units | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Type of Waste | *Destructive* | *Obstructive* | *Capacity* | *Capacity* | *Efficiency* | *Inhibitive* | *Capacity* | *Inhibitive* | *Capacity* | *Capacity* | *Efficiency* |
| Steel mills | | X | X | X | X | X | | X | | | |
| Oil Refining | | X | X | | X | X | X | X | | | X |
| Gasoline production | | | | | | X | | X | | | X |
| Wood pulp | X | | X | | X | | | | | | |
| Sulfate | X | | X | X | X | X | | X | | | X |
| Sulfite | X | | X | X | X | X | | X | | | X |
| Soda | | X | X | X | | X | | X | | | X |
| Groundwood | | X | X | | X | | X | | X | | X |
| Paper | | X | X | X | X | | X | | X | X | |
| Paperboard | | X | X | X | X | | X | | X | X | |
| Coke | X | | X | | X | X | | X | | | X |
| Beer | | | X | X | | X | X | | X | | X |
| Whisky | | | X | X | | X | X | | X | | X |
| Creamery | | | X | X | | | X | | X | X | X |
| Butter & Cheese | | X | X | | X | | X | | X | X | X |
| Cannery | | X | X | X | X | | X | | X | X | |
| Ice manufacture | | | | X | | | | | | | |
| Soft drinks | | | X | X | | | X | | X | | |
| Textiles | | | | | | | | | | | |
| Cotton | | X | X | X | | X | X | X | X | X | |
| Wool | | X | X | X | | X | | X | | X | X |
| Rayon | | | X | X | | | X | | X | X | |
| Wool scouring | | X | X | X | X | X | X | X | X | X | X |
| Tannery | | X | X | X | | X | X | X | X | X | X |
| Glue manufacture | | X | X | X | X | X | X | X | X | X | X |
| Soap manufacture | | X | X | X | X | X | X | X | X | X | X |
| Slaughterhouse | | X | X | X | X | | X | | X | X | X |
| Meat packing | | X | X | X | X | | X | | X | X | X |
| Cane sugar (alcohol distilleries) | | | X | X | X | | X | | X | X | X |

concern. Here again, however, the average sludge pump selected usually has a capacity of from 75 to 150 gallons of sludge per minute, and is usually based on an operation period of not over 6 hours per day, broken into intervals by automatic time control. Therefore, these same pumps may easily handle the sludge of 3 to 4 times the volume that has been normally expected, without trouble. These are not arguments for refraining from making additions to the plant, but are intended to point out that while such additions are being made, the plant may be made to function satisfactorily with more attention but with the same elements.

### *Sludge Disposal Problems*

The main plant units which suffer because of the additions of large amounts of organic and suspended matter are the digestion tanks and the sludge drying units—sludge drying beds, heat dryers or vacuum filters. The designs of these units are based upon the handling of an average amount of solid matter per person per day, and capacity is provided on this basis. Therefore, if the volume of sludge is increased materially, the time period in the digestion units will be lessened, with either improperly digested sludge being turned out or operation difficulties presented. Thus, if heavy additional loads of suspended solids are caused by the handling of industrial wastes, it will usually be necessary to increase the digestion capacity in proportion. Sludge drying beds may not be able to handle the increased load of digested sludge, particularly, if because of insufficient capacity in the digestion tanks, the sludge has not been completely digested. If the local climatic conditions are such as to preclude rapid drying the beds may become seriously overloaded with drying sludge. This condition may require the rapid provision of additional bed capacity, or perhaps the use on the sludge beds of glass covers, similar to those used on green houses. By protecting the drying sludge against wetting by rain, these will normally double the capacity of the beds. However, such covers are costly and the cost of covering a sludge bed versus adding additional open beds is an economic consideration. In cases where sludge bed area is limited to available areas, the cost of covering with glass versus the cost of obtaining additional land must be balanced. In such cases, it is frequently wise to consider the vacuum filtration of the sludge. This eliminates the sludge beds entirely, but involves the cost of conditioning of the sludge for proper filtration. While vacuum filtration of sludge is generally more economical on large plants, where ground area for sludge drying beds is not available, or for esthetic reasons cannot be used, numerous small plants have adopted this means of sludge dewatering. With such filters, the entire operation can be contained inside a small building and the open sludge beds are eliminated. The open sludge drying bed may be objected to by local residents, but the glass covered beds are seldom objected to. This, in the writer's opinion, is due to the fact that people in general smell with their eyes, and if a thing is not objectionable visually they say nothing about it. Also, everyone is accustomed to associating a greenhouse with the pleasant smells of flowers, and this smell is associated with the glass covers of sludge drying beds. The selection of a sludge drying or sludge dewatering means to augment present capacity is a responsibility which should be placed in the hands of an experienced engineer.

When industrial wastes are to be handled by a city system the effects on the system itself and on such important parts of it as the treatment plant, must be given careful study and a decision arrived at which is equitable both to the people of the city and to the industry creating the wastes, since the industry may be an important factor in the industrial economy of the community. This decision must take into consideration the responsibility of the city for handling this additional load and the responsibility of the industry for creating it and the ultimate answer must be fair to the taxpayers and to the industry.

When certain wastes, high in pollutional load, but low in total solids, such as those from breweries, distilleries, etc., are contributing to the system, it may be possible to handle these at the existing plant by installing a primary method of predigestion which will reduce the BOD to such an extent that the plant units following may still function satisfactorily on the pre-digested effluent. Also, where wastes are added which contain large percentages of greases or very light solids, fibers, etc., these may be removed by installing a unit which

(Continued on page 107)

**Table II.—Water Usage by Various Industries**

| *Industry* | *Unit of Production* | *Gallons per unit per day* |
|---|---|---|
| Beer | barrel of beer | 470-2500 |
| Beet sugar | ton | 24000-36000 |
| Cane sugar (refining only) | ton | 1000 |
| Canning and preserving | case of cans | 7.5 to 250 |
| Coal washing | ton | 200 |
| Coke | ton | 3600 |
| Cotton goods | pound | 8-40 |
| Dairying | one gallon milk | 5 |
| Gasoline production | barrel of gasoline | 1050 |
| Ice (manufactured) | ton | 0.12-45 |
| Meat packing (hogs) | per hog | 11 |
| Milk, cream and butter | pound | 0.11-1.25 |
| Oil refining | barrel of oil | 770 |
| Paper | ton | 39000 |
| Paperboard | ton | 7600-90000 |
| Rayon | pound | 90-202 |
| Soap manufacture | pound | 0.12-224 |
| Soft drinks | case of bottles | 2.5 |
| Steel (finished) | ton | 65,000 |
| Tanning | pound | 8 |
| Wood pulp | | |
| Sulfate | ton | 64000-70000 |
| Sulfite | ton | 60000-80000 |
| Soda | ton | 85000 |
| Groundwood | ton | 5000 |
| Wool scouring | pound | 1.26 |
| Woolens and worsteds | yard | 40-510 |

# Rubber-Asphalt Pavement Test in MILWAUKEE

JOHN HUBEL

SECTIONS of one of the main-traveled streets in Milwaukee, originally surfaced with asphalt many years ago, has become the proving ground for a mixture of new asphalt and granulated rubber. These test sections were laid about 18 months ago. A small percentage of powdered rubber was added to each batch of asphalt to determine what effect this would have on the wearing qualities of the surfacing. The test sections were laid on one of the city's busiest thoroughfares, leading from Milwaukee westerly. All are within the city limits.

The test sections were inspected by the members of the American Road Builders' Association, which held its meeting in Milwaukee in the spring of 1951. In addition, constant testing and inspection have been carried on by the city. The rubber-asphalt pavement was prepared in the municipal asphalt plant, which is located some three miles from the test sections.

After being subjected to very heavy traffic for a period of a year and a half, the engineers in charge of the work state that the rubber-asphalt surfacing is satisfactory; however, they desire to make additional tests over a longer period of time. As in other cities where rubber-asphalt surfacing has been laid, extended testing will be carried on before adoption for large-scale use. In part, at least, this is due to the costs of the added rubber; and also to the fact that costs and prices may vary after the present emergency has passed.

Rubber has been used in paving tennis courts, playgrounds, parking lots, floors and similar surfaces. In Milwaukee, the roadway of Kilbourn Ave. bridge was paved some years ago with a rubber covering. This was replaced with other material, as the rubber squares, which were nailed down on a wood base, sometimes lifted at the ends. Replacement was due primarily to the unsatisfactory method of attachment of the squares to the bridge floor rather than to any failure of the paving itself. On this bridge, the walks still have a rubber surface, and the pedestrian traffic has not affected attachment to the base nor has wear been serious.

● **IN LAYING THIS test section of rubber pavement in Milwaukee, three types of rubber were used in the mix—natural, processed and synthetic. City officials look on.**

Rubber-asphalt surfacing was also laid on a heavily traveled viaduct connecting north and south 35th St. This was laid as patches in 20 ft. by 10 ft. sizes, to determine whether or not the mixture will give more elasticity and will reduce skidding. These patches are being tested from time to time, but no definite reports are yet available.

In the test sections on the principal highway, ground natural rubber was used on one section, processed rubber on a second section, and synthetic rubber on a third section. Proportions of rubber used were as follows: For the natural rubber, 18 pounds to each two tons of asphalt mix; for the processed rubber, 26 pounds; and for the synthetic rubber 18 pounds. When mixed with the asphalt surfacing, the presence of the rubber cannot be detected from its appearance.

Milwaukee has one of the most efficient and completely equipped testing laboratories in this country. It inspects and tests all products purchased for the Milwaukee Department of Public Works. This laboratory is performing continuing tests on the rubber-asphalt mixture, both in the laboratory and on the job, in order to evaluate the relative merits of the three mixtures used. These tests cover strength, stability, non-skid ability and wearing qualities, and periodic reports of results are being made to the Public Works Department.

● **RUBBER-ASPHALT mixture is easily handled by normal asphalt paving equipment, without complications. Under direction of Sup't. R. W. Gamble, 400 yds. were laid.**

● GETTING THE dirt to cover Seattle's sanitary fills. About 150,000 cubic yards were required in 1952. Lima ¾-yd. shovel loads into International truck.

# SANITARY FILLS PAY OFF IN SEATTLE

**R. F. KAROLEVITZ**

SEATTLE, a rapidly expanding city of 477,000, is currently knee-deep in sewage disposal problems. Pollution in Elliott Bay, the city's harbor, has spurred a concerted drive for treatment plants. A public opinion campaign by the Seattle Post-Intelligencer has been instigated to save the near-at-hand salmon fishing and to protect local beaches.

But, meanwhile, as this new chapter is being formulated, another phase of waste disposal has shown a most successful development in the Queen City of the Pacific Northwest. Seattle's City Engineer and her garbage collection contractor have continued and expanded the use of sanitary landfills within the city's corporate limits to the betterment of the community's appearance, to the improvement of land values and to the more efficient disposition of waste products.

Sanitary fills are of extreme value to a city with a topography like Seattle's. Because of the exceedingly hilly terrain in and around the Puget Sound metropolis, there are also a great number of ravines and low spots. As they lie, these areas are of small or no "real estate" use. At the same time, Seattle has three large lakes within or touching her boundaries. Marshy regions around the lakes are useless to navigation, poor for fishing purposes and are likely breeding spots for pests. Large areas of tidelands have been too low, soft and soggy for successful utilization. A well-planned fill program is and has been aimed at converting this useless land into park, building and playground tracts, while at the same time removing unsightly and unhealthy areas within the city.

At present there are four sanitary fills in operation in Seattle proper. Two of these are on land belonging to the city, one is on the property of the University of Washington and the other is on private property by agreement with the owner. Together they total over 85 acres with the bulk of the area contained in the city-owned tracts.

### *Refuse Collection*

The collection of garbage and refuse in Seattle as well as the operation of the landfills is on contract to a commercial firm. The contract is awarded for a five-year period on a competitive bid basis. Seattle householders receive regular weekly collection services without charge. The cost is paid out of the city's general tax fund.

The Seattle Disposal Company, renamed the City Sanitary Service Company, is the present contractor. It is operated by Josie Razore, A. M. Morelli and John S. Banchero. City Engineer Ralph W. Finke supervises the contract through the Maintenance Division, one of five separate branches of his organization. The others are the Construction Division, Designing and Planning Division, Traffic Division and the Administrative Division. Head of the Maintenance Division is W. R. Johnson, while his assistant, D. A. Anderson, is garbage collection and disposal supervisor.

A special contract for disposal of swill from restaurants, hotels and similar establishments is under the supervision of the Seattle-King County Public Health Department. This contract, incidentally, is also held by the Rozare-Morelli-Banchero organization.

The latest garbage and refuse contract, signed this fall, calls for a change in the method of handling waste in the four fills. Instead of dumping the refuse over the slope from the top of the fill, this new "compaction" method requires the contractor to deliver the material at the bottom of the incline. A bulldozer is then used to push the garbage into place, up the slope which is maintained at no less than a 15 per cent grade. All boxes, cartons and other containers are completely collapsed, while the bulldozer is

● **WORKING ON the fill: A D6 Caterpillar tractor shifts a big pile of refuse.**

used to compact completely all material going into the fill. All lifts or layers in Seattle's fills are held to a height of eight feet. Side slopes are raked and left with approximately 1½ to 1 slope on a smooth surface.

### *Advantages of System*

According to Harvey J. Mashinter, Maintenance Division assistant who personally supervises the garbage contract, this system of filling has the following advantages:

1. It produces less shrinkage and settlement.

2. It eliminates all cavities which might provide breeding places and refuges for vermin and rodents.

3. It allows for more use of the land through the completion of a new portion of the fill with each day's work.

4. It practically eliminates voids and makes it possible to control the spread of fill fires; it also reduces the fire possibilities.

5. It aids in the elimination of possible disagreeable odors since at the end of each working day all incoming garbage must be in its final place and covered with earth.

At the same time, Seattle's City Engineer is looking to the future with this new method of filling. With the rapid development of the city, he foresees the day when landfill areas will become relatively scarce, while the garbage and refuse will be coming in ever-increasing quantities. This latest compaction method seems to be increasing the waste content of the fills by as much as 50 per cent.

Fill coverage is also expected to be improved by this new method. According to W. R. Johnson, after a year of internal compaction old fill covers have shown a tendency to harden and crack thus allowing odiferous gases to escape. This has required considerable scarifying to seal the "leaks." Good original compaction will reduce the settlement and the accompanying cracks in the fill surface.

Earth for the fill coverage is provided by the garbage contractor and paid for by the city. He is permitted to stockpile a reasonable amount of earth on the disposal site—not too much to cause settlement—but the city pays for the dirt only after it is actually in place on the fill.

### *150 Trucks Used*

The sanitary service company has 150 trucks operating on garbage and trade waste pickups in Seattle. These trucks average a total of 33,000 stops a day and haul to the sanitary fills as well as to the city's three fire dumps. The company uses International K-7s for its services.

These trucks are fitted with 25-yard steel bodies. The bodies are slightly tapered—wider in back than in front—to facilitate easy dumping of the garbage. Dimensions are 7 ft. 4 ins., by 15 ft., by 7 ft. 6 ins. The company is now experimenting with roller-type steel doors to replace the overhead doors now being used. The latter require extensive clearance space and are constantly being damaged by low-hanging branches and wires. The new doors are being supplied by the San Francisco plant of the Kinnear Manufacturing Company.

Under terms of the new contract all trucks must now be painted uniformly with truck numbers at least four inches high and of a contrasting color painted on the sides and rear of each vehicle. Only these numbers and the contracting company's name are allowed on the trucks.

To haul earth for fill coverage the company uses 16 International dump trucks. Four shovels are also employed: one ¾-yard Lima, one ⅜-yard and one ½-yard Michigan and one 1-yard Northwest. For compacting refuse on the fills, the company uses two HD-5 Allis-Chalmers tractors and two Caterpillar D-6 tractors equipped with No. 6S bulldozers.

Last year the amount of garbage and refuse hauled into the four fills by the contractor was as shown in

**TABLE 1. Amount of Garbage and Refuse Hauled in 1951**

| Fill | Yards | Tons | Tons Per Day |
|---|---|---|---|
| Ravenna (10) acres) | 535,695 | 91,604 | 293 |
| Interbay (25 acres) | 472,792 | 80,847 | 258 |
| Rainier (40 acres) | 160,481 | 27,442 | 88 |
| West Seattle (10 acres) | 154,661 | 26,447 | 84 |

The estimate for the 1952 total is 291,000 tons. It is also estimated that 150,000 cubic yards of earth will be necessary to cover the fill area completed during the year. The contract stipulates that "the width of the fill shall be controlled by the amount of garbage and refuse coming into the dump. Fills must progress in length not less than five lineal feet per day, or as directed by the City Engineer."

### *Local Conditions*

Some consideration must be taken of local conditions in Seattle. Because of the extensive rainfall, care must be taken to avoid use of earth with too much clay or gumbo con-

(*Continued on page* 106)

● **PART OF THE fleet of 150 International trucks which are employed for collection.**

cover are all one. When a hose must carry gases or liquids under pressure, reinforcement of cotton, rayon, nylon or steel, is wound or braided around the tube. The higher the pressure, the more reinforcement is required. In cases of extremely high temperature requirements, asbestos may be incorporated in the carcass.

The carcass must be protected from moisture, abrasion, oil, impacts and sun-light by a cover, which also

# How to Get More Service

**J. A. MULLER,**
**Executive Engineer,**
**Thermoid Company**

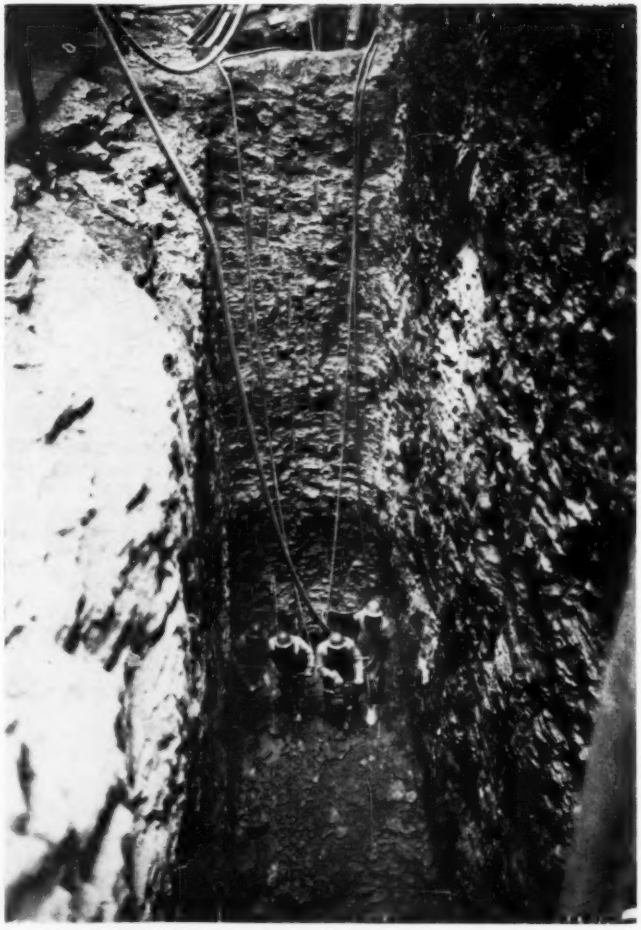
THE first step in getting the most from your industrial hose is to select the correct hose for the job. Many users give very little thought to selecting hose, buying mainly on price. It is not realized that there are many special types of hose for special applications in many industries.

The standard rubber hose consists of an inner tube, a carcass of fabric or cord and a cover. The composition of the rubber of the inner tube determines what material can be carried. The kind and the thickness (number of plies) of the carcass limits the pressures the hose can stand. The cover is designed to withstand the various working conditions encountered in industry.

Significant advances in rubber chemistry have greatly enlarged the usefulness of hose. Rubber in the tubes can be compounded to resist attack by oil, butane, propane, acetylene, insecticides, paints, lacquers, mild acids and a host of other chemicals. Hoses are in use for carrying dry and wet solids as well as gases and liquids. Abrasion resistance is built into the tubes of such material handling hose. Hose for carrying steam, hot water or other hot liquids have heat-resistance incorporated in the rubber of the tube.

### *Carcass and Cover*

The simplest rubber hose consists of rubber only and is generally used to carry water or air at low pressures. In this, the tube, carcass and



● **A TOUGH EXCAVATING job, such as is shown above, is tough on hose too. For such work, hose should be chosen for abrasion resistance as well as for pressure.**

helps identify the hose and makes for better appearance. Compounding ingredients are now available for the cover, providing better resistance to wear, to petroleum products, to sun-light and to cuts. In some cases wire reinforcement is interwoven in the carcass to prevent collapse of the hose instead of for burst-resistance, as for unloading liquids, as fuel oil, from trucks. The hose is carried on a reel from which the hose is almost never completely unwound. The pressure of many layers of hose on the reel would flatten the hose unless properly reinforced.

Although not a component of hose, couplings are an important part of any hose system. In high-pressure applications, the couplings become the most critical factor. It is easy enough to design a hose to take pressures as high as 5000 psi by using enough steel wire reinforcement and enough rubber. The problem is to bond the hose to the coupling. Thermoid has solved this particular coupling problem by a patented design in which the steel wire reinforcement is attached positively and mechanically to the coupling. This coupling finds its greatest use in the oil fields in rotary pressure seal hose.

### Selection of Hose

For long, efficient, economical life, the following factors should be considered:

1. The hose should withstand attack from the material carried. If a petroleum product is to be carried, an oil resistant hose should be specified; paint and some insecticide sprays take a special hose; steam requires a special hose.
2. Working pressure should stay within manufacturer's limits. Some hose will handle extra pressure for a while but it will fail more quickly and, more than likely unexpectedly, with damage to personnel and equipment and loss of production.
3. The temperature of both the material being carried and ambient temperatures should be considered. Low and high temperatures must be compensated for by special rubber compounds and constructions.
4. The inside diameter of a hose determines the carrying capacity. If the diameter is too small, you won't get the volume required.
5. Specify enough length to avoid stretching, but excessive length increases the chance of kinking.
6. The hose system is only as good as its couplings. Even the best hose can't operate with incorrect, improperly applied couplings.
7. Abrasion resistant covers are a must for severe service conditions such as mines, quarries and heavy industrial works.

### Maintenance

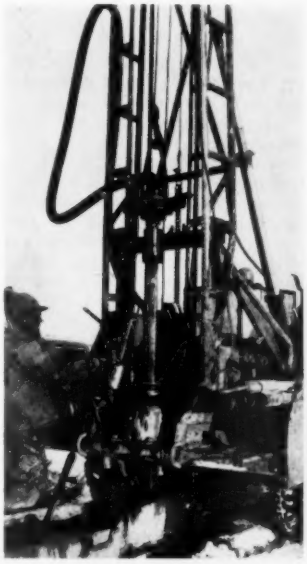
Maintenance begins as soon as the roll or length of hose is received. If the hose is not to be used immediately, store it inside, out of direct sunlight and in the manufacturers original wrappings. Do not unwrap and lease the roll outside in direct sunlight.

When the hose is to be used, unwrap and uncrate carefully. Don't slash at the bindings with a knife; you may cut gashes in the new hose. If delivered uncoupled, make sure the correct types and sizes of couplings are used. Check the length required before cutting. Use a sharp cutting tool and cut the hose square. Make sure the coupling is properly placed on the hose, that it is inserted all the way in and that the securing clamps or other devices are tightened. Keep the hose away from hot pipes, stoves and hot pieces of equipment. If contact with hot metal cannot be avoided, cover the hot spot with asbestos.

Although anti-oxidants are put into all modern hose covers, oxidation remains the principal enemy of rubber hose. Strong, direct sunlight speeds up oxidation and should be avoided. A particularly bad offender is ozone ($O_3$) which occurs to some extent at high altitudes and in harmful concentrations near high-voltage equipment. Oil and grease on a hose are bad unless the hose is specifically designated as oil-resistant. Harsh abrasion and punctures should, of course, be avoided. It is generally good practice to cut out a badly worn spot before an actual failure occurs and install a new coupling. Take care to keep hose away from falling rocks. In quarries and mines and on construction jobs where falling material is a normal occurrence, hose should be removed to a safe area before blasting or should be protected by a guard. At road crossings hose shou'd be carried overhead on a scaffolding or underground by use of conduits.

When not in use, hose should be stored inside, out of the sun, flat on the floor rolled in coils of large diameter to avoid kinking. The rolls should not be so large that the weight of the coils will crush or damage the bottom layers of hose.

For temporary storage hose can be hung on wall brackets. Adequate support in more than one place is required to prevent sharp bends. Hooks or other supports should be thick enough so that the hose is not cut or subjected to excessive distortion at the point of contact.



● **WHEN WORKING under low temperature conditions, special hose may be used to insure long service life.**

**from INDUSTRIAL HOSE**

# Atrocious Timing—But Still Needed

UNDER these two headings, the *Toledo Municipal News* recently discussed the impact of last summer's water rate increase on the citizens of Toledo. The background of the story is this: Since 1947, the Toledo Water Department has repeatedly recommended a revision of the water rate structure to provide funds for needed improvements for plant expansion. Finally, with strong backing from many sources, these recommendations were heeded—partially—in 1951.

Before action was taken, however, the 1951 fall elections occurred, bringing about many changes in the City Council. The "lame-duck" councilmen then blocked any positive action, leaving the decision to the new Council which took office Jan. 1, 1952. In March, 1952, the new rate schedule was adopted effective April 1.

### *Consumption Increases*

The recommended rate increases were proper and the voters knew it. They understood that a second line across the river was imperative and that more pumps and a larger filter plant were needed. Water use increased from 89 gpcd in 1921 to 120 in 1934 to 146 in 1949. Industry used 44 per cent of the total in 1940 and 57 per cent in 1950. The voters were told that the cost of correcting these defects would be roughly two and a third cents a day.

What happened? With the driest summer in 22 years, the first quarterly bills sent out after the increase took effect reflected a doubled use of water; and to this was added an increase of about 70 per cent due to the new rate structure. The effect was like a one-two punch. Says the *News*: "*Toledo* citizens are dismayed, disgruntled and disgusted with the current high water bills, and it will take more than a gush of bill-checking, weather reports and special hearings to level the stormy waters."

The lesson in all of this, learned the hard way—as so many lessons are—is that good timing should be observed in making rate increases. If the Toledo rates had been increased in the fall quarter so that the consumers would have had a chance to become acclimated gradually to the higher rates, there probably would have been few complaints. As the *News* said: The findings . . . force the conclusion that the rates, in view of needs and estimated costs, are justifiable and are not prudently reducible; and that lower rates, except as costs may be reduced below estimates, would only prolong or postpone improvements already six years overdue."

Water officials cannot forecast a drouth; but when an increase is necessary they can reduce the risk by careful scheduling of rate increases so that abnormal water usage is unlikely to be superimposed onto the increased rates, resulting in a flood of protests through the added burden it suddenly places on the consumer unready for the doubled or tripled cost of water. It is well to reiterate here that the ably led and organized Toledo Water Department was not responsible for the timing of the rate increase; but it nevertheless was subjected to a great deal of criticism as a result.

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# New Floor + Beam Reinforcement = New Bridge

NEARLY 30 years ago, Junius T. Moore, Sr., of Charleston, W. Va., designed and fabricated the bridge over the Elk River at Clendenin, W. Va. Now he has helped transform this bridge from a virtually useless "ugly duckling" to a modern and fully useful structure. The cost was only $50,000—one-third of what it would have cost for a new bridge.

The Clendenin bridge, built in 1923, has a center span of a through Pratt truss 149 ft. long. This is flanked on the north end by a 66-ft. span Warren pony truss and a 28-ft. deck girder section. On the south end, there is a 78-ft. Warren pony truss and a 35-ft. deck girder. The roadway is 16 ft. wide, and there is a 5-ft. wide side walk on either side. The bridge was designed for a loading equal to that of two 15-ton trucks with 10 tons on each rear axle and 5 tons on each front axle.

By last year, it had become apparent that the bridge was unable to carry present-day traffic loads. Maintenance of the wood flooring and recovering it with asphalt was inadequate. School buses were no longer allowed to cross it. Frank McEnteer, bridge engineer; Frank Bisping, of Permanent Builders, Inc., the bridge contractor; and Mr. Moore, now president of Metal Products Co., conferred on the problem. Aside from the high cost of building a new bridge, there was another important consideration. The only way of getting into and out of Clendenin is over the existing bridge. Closing of the span for any extended period would create a serious problem.

The problem was solved by using light-weight open-mesh steel decking for the floor and by reinforcing some of the bridge members. The old wooden floor was removed, one lane at a time, reinforcement placed where needed and the bridge completely refloored with Irving decking. In addition, the span was cleaned and painted. The bridge is now able to carry the standard H15 loading. About 6,000 square feet of Irving decking was required. The total cost amounted to $50,000. The result has been most satisfactory.

**An "ugly duckling"**

**Pleasing and useful**

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# APWA news

AMERICAN PUBLIC WORKS ASSOCIATION
1313 EAST 60TH ST., CHICAGO 37, ILL.

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J. J. DEAN
SOL ELLENSON
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## APWA Awards—Chapter Activities

IN order that the many readers of Public Works may be currently informed on the subject of awards presented by the Association, but established by the generosity of others, there follows a description of awards the Association presents annually.

### *Charles Walter Nichols Award*

To recognize outstanding and meritorious achievement in the public works field, Charles W. Nichols, chairman of the Board, of the Nichols Engineering and Research Corporation, New York, established, in 1950, the Charles Walter Nichols Award. In doing so, he selected the American Public Works Association as the vehicle and means through which the award should be presented.

This award and its companion Honorary Mention award were first presented in 1951. The Charles Walter Nichols award and $500 honorarium were presented to Wm. A. Xanten, Supt., Division of Sanitation, Washington, D. C., "for his consistent leadership over many years in the development, operation and management of refuse disposal facilities in our nation's capital, climaxed by the construction of a refuse transfer station incorporating a unique dust and odor control system."

The Honorary Mention Award Scroll was presented to N. M. Ulsch, Assistant Supt., Department of Street Cleaning, Jacksonville, Florida, "for his conception and production of a technicolor motion picture titled 'Your Street Cleaning Department' as an ingenious means employed in winning public understanding and support for making Jacksonville a cleaner city."

In 1952, John W. Hood, Supt. of Sewage Treatment, Ridgewood, New Jersey, received the Charles Walter Nichols Award and $500 honorarium. The Honorary Mention Award Scroll was presented to Carl Schneider, consulting engineer, Dept. of Sanitation, New Orleans, La. Details of these awards were listed in the October issue of APWA News.

A summary of policies and procedures covering the awards follows: *Type of Award*: To consist of an honorarium of $500 and a scroll describing the achievement. In addition there will be one honorary mention award consisting of a scroll describing the achievement and awarded to the one who occupies second place in valuation of accomplishments as determined by the Committee on Awards. It is proposed that awards will be made annually, but no awards need be made if it is determined by the Award Committee that the achievements of the candidates sponsored are not of sufficient merit to be worthy of an award.

*Eligibility*: To be eligible for the award of $500 and honorary mention award, a recipient must be an active member of the American Public Works Association engaged in full-time employment by a municipal government. In no case shall a candidate for the award be in such position as to receive any commercial return for his achievement, so long as he is an employee of the governmental unit.

*Field of Activity*: The field of activity for the awards shall be that of sanitation in its broad sense. For clarification the field of sanitation may include: a. Street Sanitation; b. Refuse Collection and Disposal; c. Sewers and Sewage Treatment; and d. Water Supply and Treatment.

*Selection*: The candidate must be sponsored by an APWA Chapter, a State Chairman or a petition signed by five active members of the American Public Works Association. Actual selection of candidates will be made by a special Committee of three active members appointed by the Association President and confirmed by the Board of Directors. In addition, the action of the special committee shall be confirmed by the Board of Directors.

*Basis of Award*: The basis of the award will be a paper or description of an operation, administration or design of a function in the field of activity, which will indicate originality of thought by the candidate. The ideas developed or designed must have been put to practical use within the governmental unit in which the candidate is employed.

### *The Samuel A. Greeley Service Award*

During the 36th annual convention of the American Society of Municipal Engineers (one of the parent organizations of APWA) held in Richmond, Virginia, in 1930, the establishment of an award to honor those engineers who had given long and faithful service to their communities became a fact. For many years, Samuel A. Greeley, one of the outstanding consulting engineers serving municipal governments, had believed that engineers and public works officials who had served their communities continuously for a long period of time should be given formal recognition. To this end he established a fund, the earnings from which were to be used for this purpose and it was to be known as the Greeley Veterans' Award.

At the time of establishment of the award, eligibility for a candidate was (1) 25 or more years continuous service in a single community in an official capacity, and (2) a member of ASME in good standing for at least five years previous. Since 1930, there have been some revi-

sions to the rules and regulations and today the award is known as the Samuel A. Greeley Service Award and eligibility is confined to those who have served their community continuously thirty or more years and have been members of APWA for at least five years. The present day award is a very fine certificate which is presented at the annual dinner session of the Public Works Congress held each year. Those receiving the award at the 1952 Congress in Los Angeles were listed in the October issue of APWA News.

The recipients of this award are designated by a Service Award Committee consisting of three members of the Association who are appointed annually by the president. If the report of this committee is approved by the Executive Committee of the National Association, those so designated in the report receive the award at the next annual meeting of the Association.

### *APWA Chapter Activity*

In the November issue of Public Works the matter of Association Chapters was briefly mentioned but this phase of Association activities is so important that it is considered wise to present the picture somewhat more in detail.

The Association believes that one of the most important contributions towards its objectives is the creation of chapters throughout the country for the purpose of bringing together, as often as possible, the public works people within the Chapter jurisdiction. Everyone seems to agree that frequent meetings and "bull" sessions for men engaged in similar work are of utmost importance in stimulating enthusiasm for doing a better job. Frequently, by interchange of ideas, men find that the answer to a troublesome problem may be obtained from his next door neighbor who may have experienced and solved the identical problem.

Chapters are considered so important to the growth and ultimate objectives of the Association that Article XI of the Constitution reads as follows: *Section 1:* The Association shall encourage and recognize the establishment of regional, state, and local chapters of its members, the purposes of which shall be the furtherance of the objectives of the Association in the region, state or locality. Applications for the establishment of a chapter, together with a copy of the proposed chapter by-

(*Turn to page* 85)

## Washington news

Presented in cooperation with the American Public Works Association and through the courtesy of the Washington Office of the American Municipal Association.

CHLORINE has been removed, as of November 1, from the Scarce Materials List. No longer will municipal public works officials have to obtain priority ratings to purchase chlorine. Presumably dealers now have ample stocks on hand.

### Construction Regulations Relaxed

Relaxations of construction regulations which, effective May 1, 1953, will increase amounts of controlled materials that may be self-authorized for municipal and most other types of construction, as well as lift the ban on recreational construction, were announced by Richard A. McDonald, Administrator of the National Production Authority, Department of Commerce.

A new Direction 8 to Revised CMP Regulation 6, the basic construction order, was issued by NPA providing for the future relaxations. NPA said it was issuing the direction now, although deliveries of the new quantities of controlled materials may not be made until after May 1, so that builders may do preliminary planning for future construction and place advance orders with suppliers.

The relaxations had been scheduled for April 1. In announcing the change to May 1, Mr. McDonald noted that the steel scarcity still prevailing as a result of the steel strike indicates that NPA must proceed with proper caution. "We want to be sure," he said, "that by the time the relaxations are effective the materials situation will permit orders to be filled without serious difficulties."

The new Direction 8 to Reg. 6 provides that, starting May 1, 1953, self-authorization will be permitted up to the following amounts:

1. For recreational, entertainment and amusement construction per project, per quarter: 5 tons of carbon steel (not to include more than 2 tons of structural shapes), 500 pounds of copper and copper-base alloys, and 300 pounds of aluminum. Previously, no self-authorization was permitted for this type of construction. Also, foreign and used steel will be permitted for recreational construction in accordance with Article VI of Reg. 6.

2. For highways, per project: 25 tons of carbon steel, (not to include more than 12 tons of structural) and the same amounts of copper and aluminum now permitted—500 pounds of each. The present steel limit is 25 tons, not to include more than 2 tons of structural.

3. All other construction, per project, per quarter: 25 tons of carbon and alloy steel, including structural (not to include more than $2\frac{1}{2}$ tons of alloy and no stainless), 5,000 pounds of copper and 4,000 pounds of aluminum.

In regard to "all other" construction, NPA noted that it is eliminating the distinction now existing in the regulation between "industrial" and "all other" construction and will permit the same self-certification quantities for both. "All other" construction will include industrial, commercial, public, hospital, university, school, public utility, water and sewage projects and transportation facilities.

At present, all of these types of construction except industrial are allowed to self-authorize 5 tons of carbon steel (not to include more than 2 tons of structural but no wide-flange beams or sections), 1,000 pounds of copper and 2,000 pounds of aluminum, per project, per quarter.

NPA also announced that, effective immediately:

1. Sections 9 and 23 of Reg. 6 are amended to add schools and hospitals to those categories of construction which are allowed to use DO ratings for purchase of such consumer goods items as furniture, stoves, refrigerators, etc.

2. The allotment symbol T-9 will be used for construction under the jurisdiction of the NPA Water Re-

sources Division instead of the symbol U-8.

3. Applications for recreation facilities which are part of a hospital or school project should be filed with the Federal Security Agency, or, in the case of a veterans' hospital, with the Veterans Administration.

4. In an amendment to Direction 2 of Reg. 6, the quantities of copper and aluminum which can be self-authorized for reconstruction or repair of disaster damage are increased to conform them to the quantities now permitted in Reg. 6.

• • •

## APWA

laws and a list of those who have agreed to become members of the chapter, shall be submitted to the Board of Directors for approval. Upon notice of approval given by the Board, the chapter shall be considered established.

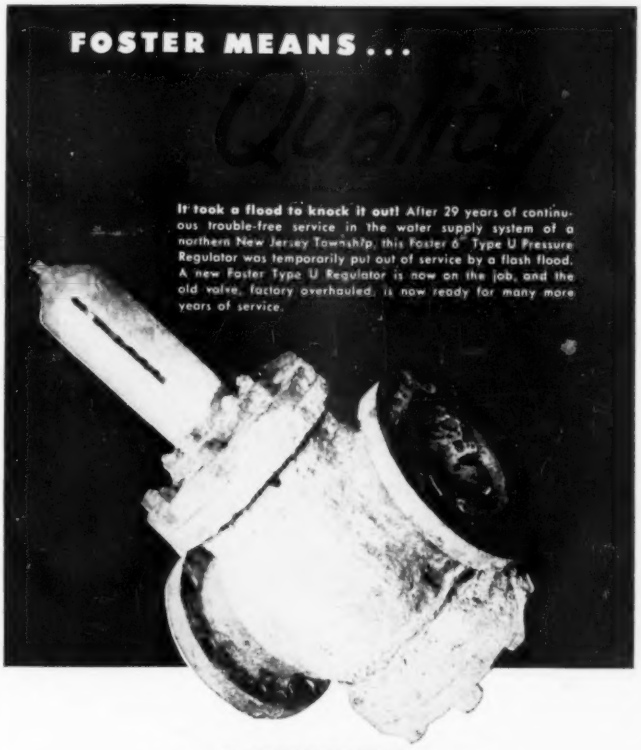
*Section II*: All chapters shall be managed in conformity with the Constitution of the Association and the rules established by the Board of Directors.

The Board of Directors has developed a simple set of rules governing the establishment of chapters and their operations. A brief summary of their procedures will indicate how easy it is to form a chapter and thus bring public works men together at frequent intervals for exceedingly worthwhile meetings.

a. Chapters of the American Public Works Association may be formed by groups of members representing a city, a metropolitan area, a state or an interstate region, for the purpose of furthering the objects of the Association in the Chapter's jurisdictional area.

b. Petitions must be signed by at least fifteen members or applicants for membership for a city, metropolitan or state chapter, and by at least twenty-five members or applicants for membership for a regional chapter. Approval of the petition by the Board of Directors of the Association will carry with it the assignment of a jurisdictional area, and the granting of the right to draft by-laws to govern the chapter's operation. Such by-laws must be submitted to the Board of Directors of the Association and shall not be considered effective until the Board's approval has been granted. Approval will be followed by the granting of a charter to the chapter.

c. Chapter by-laws must receive



FOSTER MEANS...
It took a flood to knock it out! After 29 years of continuous trouble-free service in the water supply system of a northern New Jersey Township, this Foster 6" Type U Pressure Regulator was temporarily put out of service by a flash flood. A new Foster Type U Regulator is now on the job, and the old valve, factory overhauled, is now ready for many more years of service.

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There is a specific type of Foster automatic valve for every service need. Each valve is engineered and built to do its job with a comfortable margin to spare, which means low maintenance.

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the approval of the Chapter's membership before being submitted to the Board of Directors of the Association.

1. Establish the name of the chapter and define its jurisdictional area; 2. State the purposes of the chapter; 3. Define the membership of the chapter; 4. Vest responsibility for the government of the chapter in a governing body (preferably to be called an Executive Committee) and define the membership in that body; 5. List the chapter officers and define the responsibilities assigned to each; 6. Provide a method of nominating and electing chapter officers and members of the governing body; 7. Provide for the calling of meetings of the chapter and of its governing body; 8. Provide methods for amendment.

d. A Chapter may provide for membership in the chapter only and for the participation in chapter meetings and other chapter activities of students, juniors, citizens, or other individuals not members of the Association, and may establish a schedule of chapter dues for such individuals. Meetings of all chapters (City, Metropolitan, State and Regional) must be held at least once annually.

e. In addition to its schedule of meetings of its membership a chapter may engage in a program of activities designed to further the chapter purposes. Such a program of activities shall not be inconsistent with the constitutional purposes of the Association, and shall not include any items of a partisan, political, or religious character, or any efforts designed to influence national legislation.

f. Membership is not to be allowed to fall below fifteen, for a city, metropolitan or state chapter, nor twenty-five for a regional chapter.

g. The Board of Directors of the Association at its discretion will make available to chapters funds sufficient to finance a minimum program of activities.

Full information on the procedures for initiating new chapters can be obtained by writing the Executive Director.

## If You Need to Dredge A Reservoir, This Will Help

AS with many reservoirs, silt deposits built over a number of years interfered with the use of Indian Lake, Russells Point, O. In many areas, the silt had reached such a depth that it limited boating activities and was easily stirred up by shore line activity. It was decided to build boat channels, open up additional dock space and use the silt so removed to fill in swampy areas.

A 10-inch hydraulic dredge was purchased from the American Steel Dredge Co. some four years ago. This unit is powered with a 260-hp Superior diesel engine. Rated capacity is 110 cu. yds. an hour through a 10-inch discharge line 1,000 ft. long. It can cut to a maximum depth of 28 ft., or it can cut a 40-ft. wide channel 15 ft. deep. The dredge hull is slightly over 73 ft. long, is 18 ft. wide and 5 ft. deep. Draft is 3 ft. The hull is of knockdown, inside bolted panel construction; and the deck-house is also built of prefabricated panels. The pump is a Morris 10-inch centrifugal heavy duty dredge pump. Normal dredging requires ability to handle heavy silt and mud, as well as stone, branches and similar debris from time to time.

This unit has been operated in excess of 5,000 hours, with practically negligible maintenance costs and with low fuel and oil costs.

Another, but slightly larger, dredge has been used on another similar job at Portage Lakes, O. This is a 12-inch unit, with a 450-hp Superior diesel. Rated capacity is 170 cu. yds. an hour, dredging to a depth of 15 ft. and discharging through a 2,000-ft. line, but actual output has been 250 to 300 cu. yds. an hour. The hull, which is 80 ft. long, 24 ft. wide and 6 ft. deep, with a draft of 3 ft., is constructed of nine watertight pontoons bolted together at the deck line and fastened under water with special water-tight pin connections. This construction facilitates dismantling when moving the dredge from one location to another.

Smaller dredges are believed to be available and should be suitable for improving water supply and recreation reservoirs. It is better to prevent silt deposition, but few reservoirs are designed in such a way. Use of a dredge permits clearing of shoreline and intake areas, and the filling of marshy or low areas, often disadvantageous in a water supply reservoir; or islands or new waterfront sections can be built up in recreational lakes.

• • •

### Well-Trained Sanitary Engineer Available

A sanitary and sales engineer, now employed, desires a more suitable field of work. He is 38 years old; married; has two children. BS and MS degrees. Has had experience in sales, design and other fields. Served in Air Force during the war. Write RZ, care of the Editor, Public Works Magazine. Letters will be forwarded without acknowledgement.

• • •

### Mowing an Airport in One-Fourth the Time

High speed mowing with two Lilliston mowers pulled by International wheel tractors, traveling at 22 mph, permit mowing of the 1500 acres of Travis Field, Savannah, Ga., in little more than a week. Previously mowing had required a month. Frank Lehardy is airport manager.

FOR *Both* GARBAGE & SEWAGE SOLIDS

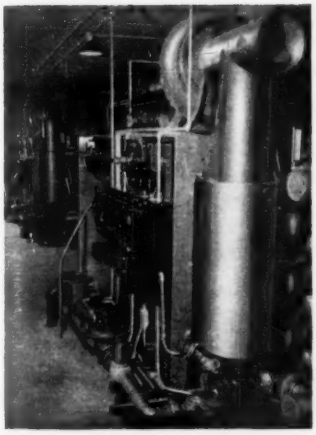
# P.F.T. Controlled Digestion

The recently completed additions to the Richmond, Indiana Sewage Treatment Plant include two new 95' diameter P.F.T. Floating Cover Digesters, with a volume of 400,000 cu. ft. The existing digestion capacity of 196,000 cu. ft., including a P.F.T. 40' Floating Cover Digester, make a total capacity now available of almost 600,000 cu. ft.

The new digesters are designed for the CONTROLLED DIGESTION of both sewage solids and ground garbage solids from an ultimate population of 60,000. The volume of gas now being produced, with the addition of the ground garbage solids direct to the digesters, is more than three times that collected prior to the additions.

Two P.F.T. No. 1000 gas and oil fired Digester Heaters supply all of the heat for the new digesters, utilizing the waste heat from the sewage gas engines. P.F.T. Gas Safety Equipment insures the safe utilization of the sewage gas.

Henry B. Steeg & Associates, Indianapolis, Indiana were consulting engineers. W. E. Ross is superintendent of the plant.



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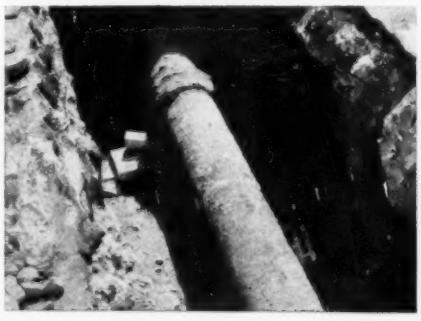
The long life and low maintenance cost of cast iron water mains—and the consequent tax savings to the public—are matters of record. An ounce of *proof* is worth a pound of *claims!*



One of a number of cast iron water mains which have been in service in New York City for more than a century. Over 35 other cities have century-old cast iron mains in service.

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# MACHINES DO THE WORK FASTER AND CHEAPER

## GETTING THE JOB DONE AT A PRICE YOU CAN AFFORD AND IN THE TIME YOU CAN ALLOW

OUR FRONT-end loader and motor grader team is our most-used equipment. We always need fill material and we use this equipment for grading new streets, excavating for curb and gutter and backfilling trenches for water and sewer pipe. H. B. Hines, Jr., City Manager, Sanford (11,000), N. C.

OUR MOTOR GRADER seems to be our most useful and efficient tool and to be able to do more jobs than any other equipment. In addition to maintaining unpaved streets and cleaning out side ditches, the grader plows out ditches for small utilities services; and in extreme hot weather, we use it for cutting down rough spots on the asphalt streets. J. O. Lambeth, Sup't. of Public Works, Thomasville (12,000), N. C.

SMALL MOTOR CRANE was used for replacement of defective sandstone curb. By handling the curb sections in this way, we speeded up the work and made it much safer for our personnel. Robert F. Werner, Chief Engineer, Columbus (373,821), Ohio.

WE ARE SEAL-coating our streets that are in fair condition, and using a penetration drag treatment on badly worn and patched streets to improve riding qualities. This is the second year of our program, but little work had been done on our streets for 10 years previously. We hope to finish our program in another year. This work is being done with city forces. Don Mackley, City Engineer & Service Director, Delaware (12,875), Ohio.

OUR EQUIPMENT in general use includes Turbine power sewer cleaner; a Caterpillar bulldozer and a Thew shovel for sanitary fill; a Caterpillar grader and an Oliver front-end loader for grading; a Littleford distributor for surface treatment; and an asphalt mixing plant, 40-ton capacity in 8 hours. R. J. Fiemeyer, Public Works Director, Hamilton (58,000), Ohio.

IN TUNNELING to carry a 30-inch cast iron sewer siphon under a river, the contractor, Sam Falbo of Lorain, used a steel trough chain conveyor for removing spoil from the tunnel, which was 5 ft. in diameter and was through shale. The conveyor was in 6-ft. sections, these being added as the work progressed. Total length of tunnel was 600 ft. Lewis M. Goodell, City Engineer, Lorain (53,000), Ohio.

THE LANDFILL method of garbage disposal was started last year. We use an Oliver Cletrac tractor and front-end shovel. This has worked out very well. Previously, we fed the garbage to hogs. Tom S. Cathers, City Engineer, Marion (35,000), Ohio.

OUR CHAMPION sewer drag, which is a 13-hp unit, enabled us to clean gravel from sewers we could never clean before with our old hand winch outfit. Fred M. Hughes, Sup't. Public Works Div., Springfield (77,000), Ohio.

ON PRACTICALLY all jobs we have found the Hough Model HF Payloader to be of untold value. It is used every day on city jobs or is rented to others. It has amazing capacities with a good operator. T. B. Noland, City Manager, Franklin (4670), Va.

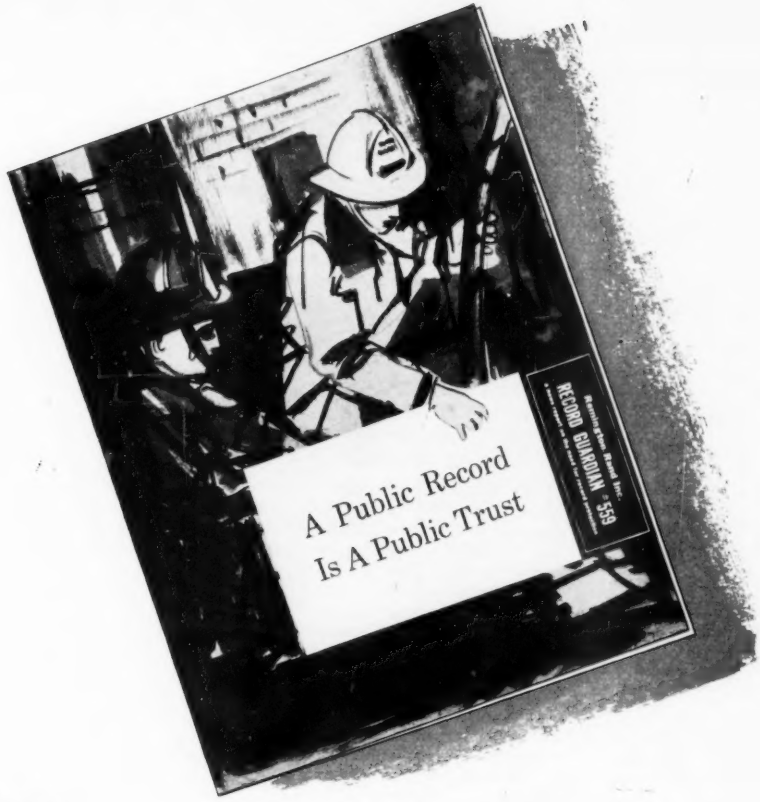
EQUIPMENT WE use includes a Traxcavator for our sanitary landfill; a winch truck and tapping machine for the water crew; a front-end loader for the street department; and a Schramm 60 compressor and a pipe finder.—Charles W. Gallaher, City Engineer, Lawton, Okla.

BITUMINOUS SURFACING was our best job. We used on this work a Caterpillar motor grader, a Tampco sheepsfoot roller, a Tampco pneumatic roller, a Ferguson steel-wheel roller, a Grace distributor, a Grace spreader box, a Hough road broom, a shop-made broom, a Quick-Way truck-mounted shovel, a front-end loader and a Case tractor. During a summer we can surface 40 to 50 blocks of streets. William T. Reed, Sup't. of Public Works, McAlester (20,000), Okla.

IN TRENCHING for small sewer lines and water mains we used an Allis-Chalmers HD5G bulldozer with backhoe attachment. This is a money-saver for a small town with a limited equipment budget. Lloyd Brady, City Manager, The Dalles (9000), Ore.

IN LAYING a mile of sanitary sewer, about half of it had to be constructed through a swamp. We used a Bucyrus-Erie 51B. We built two mats of heavy timbers and railroad ties. The backhoe moved one into place while resting on the other. The timbers were ashed to prevent the backhoe from sliding off. This proved to be a quick and efficient way to dig a trench through a swamp. Donald R. Dorneman, Borough Engineer, Clearfield (9500), Pa.

OUR HOUGH loader, which is used for loading materials, snow disposal and trench filling, is our most effective equipment. Actually, it is used on most all jobs in connection with the grading and repairing of streets and the handling of material. G. Hobart Chapman, Town Engineer, Evanston (3820), Wyo.

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## Problems of Watershed Sanitation

The steady growth of population within the Pequannock watershed is giving much concern to the Division of Water of the City of Newark, N. J. There are numerous new real estate developments within the area, and a new section of Route 23 is expected to increase this activity. The city supervises sanitary conditions, and maintains an incinerator for the destruction of garbage. Until last year the city installed septic tanks and cesspools, but now property owners have to bear the cost and build them under the supervision of city inspectors. The area is constantly patrolled.

• • •

## Tar, Tar-Rubber and Other Paving Developments

THE Testing Engineers of New Jersey, New York and New England have met annually in Boston for many years. This, however, has been more than a meeting of testing technicians to discuss laboratory procedures. One major object has been to discuss what has happened in the field and what to do about it. To accomplish this engineers of the Bureau of Public Roads, and the state highway departments are included, as well as representatives of the manufacturers of road equipment and materials.

In the recent twenty-eighth meeting, covering two days, several items of general interest were considered from the standpoint of the field and the laboratory. Some of the high lights follow.

The introduction of natural gas has reduced the amount of water gas tar available for the manufacture of road tar. Also the gas companies have had to change their process to produce a gas which will blend with the natural gas. The new oil tar thus produced has been used in New Hampshire for the past two years with satisfactory results.

The United States Army Corps of Engineers are building tar-rubber concrete runways on the air base at Presque Isle, Maine. Synthetic rubber was mixed with tar at the source of the rubber manufacture, and is being combined with stone and sand at the rate of 7.5 to 8.0 per cent. It was reported that the cost of the binder is about 75 cents per gallon at the point of origin with a delivered price of about 95 cents per gallon. This would be something more than twice the cost of the tar without the rubber. Plans have been made to use natural rubber on some future projects. This work is being done in an attempt to design pavements which will resist jet fuel spillage and jet blasts.

Connecticut has recently completed some surface treatment work using four per cent of synthetic rubber combined with road tars RT-9 and RT-6 and cut back asphalt RC-2.

It has been known for some time that lubricating oil drippings on a road surface combine with dust to make a very slippery film at the beginning of a rain. Connecticut is trying out the use of a rotary steel broom to remove the film, so far with encouraging results.

In the discussion of the use of natural rubber in bituminous concrete, it was brought out that the natural rubber, as prepared for paving, all passes a one-eighth-inch sieve. From five to ten seconds of dry mixing is needed to distribute the rubber throughout the aggregate.

The use of pre-stressed concrete for a Massachusetts highway bridge was described. The T-section beams were poured, cured and pre-stressed at a central point and then transported to the job and placed with a crane. In spite of the experimental nature of the work, the cost was little more than using conventional methods and materials. Over one hundred structures using pre-stressed concrete have been erected in the United States. A committee of the American Concrete Institute and the American Society of Civil Engineers is preparing a manual on pre-stressed concrete.

The use of a solution containing silicones for the surface protection of cement concrete was described. This material penetrates into the concrete about a quarter of an inch and coats the pores, making them water resistant. Thus the concrete is not affected by the action of salts used for ice control.

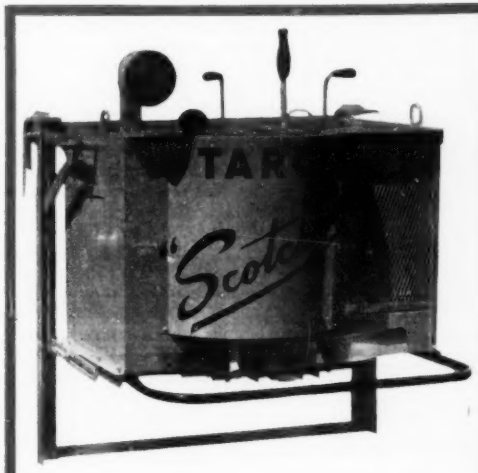
• • •

## Leo Ritter

(*Continued from page* 16)

organization; an equipment or materials distributor or producer; and a contractor. Other phases of the program include quarterly lectures at Alabama and Auburn by participating members of the Association, awards to outstanding students in

# FAST—ECONOMICAL
# ICE and SNOW Control

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- **Stainless steel**—entire material hopper, salt valve, and all other vital sheet metal parts.
- Completely **enclosed engine and controls** operate in filtered air.
- Push button electric starting system.
- **One point lubrication.**
- **Complete spreading controls** at any truck speed—width, direction and rate of salt application.
- **Self-leveling**—use bulk salt from elevated dump truck without shoveling.
- Adjustable for height—short underhang.
- Operates with **bagged or bulk salt** from any dump truck or pick-up body.
- Rear bumper guard.
- **Has no belt drives, no flexible couplings and no pillow block bearings.**
- May be installed or removed in two minutes.
- **"Scotchman" gives you perfect**—uniform—"bird-shot" **melting patterns at all widths, at any truck speed.**

## Modern Methods SAVE Money and LIVES

Whether it's picking cotton or making butter modern methods save money. It's true with your Ice and Snow Control, too. Use modern machinery and materials and *you'll save money, time and lives.*

Use the unique "Scotchman" spreader and clear salt. No sand, no cinders or other rubble to litter pavements or clog drainage. Just straight salt *correctly applied*—with a "Scotchman" spreader.

## Exclusive AIR-BLOWN Spreading Principle

Only the stainless steel "Scotchman" *blows salt undamaged* (not beaten or ground into a useless powder) in a wide, thin, even "bird-shot" meting pattern. Only the "Scotchman" goes so far, so well, with so little salt—no rings; no streaks; no waste. You'll be amazed at the fast melting action you get with only 300 or 400 pounds of salt per stormy mile—"Scotchman"-applied *—less than ½ ounce of salt per square yard.*

## Summer-Time Uses

You can use your "Scotchman" for spreading:

1. **Chemicals (NaCl or CaCl for salt stabilized dirt roads or road shoulders.**
2. **Chemicals for Dust Control and Weed Control.**
3. **Grass seed.**
4. **Fertilizer on lakes to promote fish food growth.**
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*Remember: you'll get more "mileage" from your winter maintenance dollars with a "Scotchman".*

*Semi-automatic Banox dispenser for "Scotchman" spreader*

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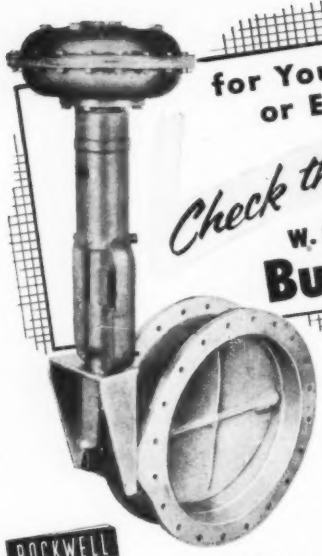

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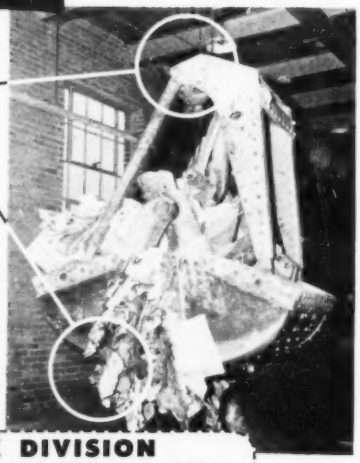

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the program, and financial assistance (student loan plan.) Students and sponsoring agencies are alike carefully screened and the entire program is ably and effectively conducted. If you are interested, write Ed Rodgers, Engineering-Manager, Alabama Road Builders Association, 215 Bell Building, Montgomery, for details.

**Compaction of Coarse-Graded Materials:** Material engineers, inspectors and specification writers who are concerned with the compaction of paving and embankment materials which contain particles coarser than a #4 sieve will find useful information in Technical Report #177 issued by the Technical Development and Evaulation Center of the Civil Aeronautics Administration in Indianapolis, Ind. The report covers a laboratory investigation which, among other things, showed that a modified Proctor procedure can be successfully used to compact coarse graded materials in either a 4-inch or a 6-inch mold. Calculation of the increase in density obtained by adding coarse materials to fine graded mixtures by means of a corrective formula applied to the density of the material finer than a #4 sieve was also verified by work covered in the report.

**Parking—One Solution:** Now under construction in Berkeley, California, is a municipal parking lot accommodating 105 cars at a time. This is financed on a cooperative basis: more than one-third of the cost is being paid by voluntary contributions from merchants and property owners in the adjacent area.

**Soil Stabilization** is an idea that is no longer new. However, the philosophy involved in soil stabilization is one which bears repeating at every opportunity. As the late Roy W. Crum once said, "a stabilized fill, subgrade road surface or road base is one that will stay put, and stabilization is the process by which it has been made that way." Stabilized soil mixtures are versatile and have a place in many phases of the development of roads, streets and airports. As bases, stabilized soils may serve to support a relatively thin wearing surface on a secondary road, a city street carrying light to moderate amounts of traffic, or an airport runway serving light aircraft. Some stabilized mixtures may serve by themselves as wearing surfaces to accommodate light traffic. They may also serve as subgrades under pavements and runways carrying heavy traffic and they

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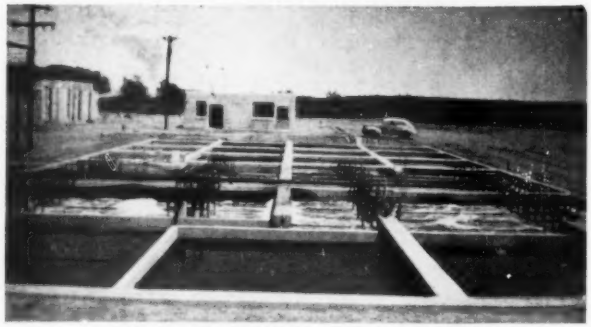

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lend themselves admirably to stage construction.

Some soils may need only compaction or drainage for stabilization. Others may be lacking in certain basic soil elements, such as granular materials or binder soil. Still others may require the use of an admixture, such as bituminous material (asphalt or tar), portland cement, lime, or any one of a number of miscellaneous materials for successful stabilization. The underlying philosophy is the use of locally available materials to effect stabilization at low cost. The most important requirement for the engineer considering soil stabilization is an open mind—all sorts of materials can be used and some extremely unlikely combinations have proved to be successful.

An example of the philosophy of soil stabilization is seen in the construction of a section of a city street in Jacksonville Beach, Florida, a couple of years ago. In this work a rapid-curing cutback asphalt was used to stabilize a mixture of sand and coquina shell dredged from the beach. At the time it was estimated that the completed pavement (designed as a base but functioning as a wearing surface) about 4½ inches thick could have been built by contract for about $.60 per square yard. In this case the subgrade was an existing shell stabilized sand. The section has functioned successfully although subjected to traffic from the city fire station, water-treatment plant, and a contractor's equipment yard.

If you have the problem of providing a demanding public with all-weather roads and streets at low cost (and who doesn't?) remember the principles of soil stabilization and don't be afraid to try something new. You'll save money if you do.

**Highway Hints:** A comparative study made in North Dakota showed that the annual cost of snow removal on a section of highway having a raised (wind-swept) grade was $277 per mile less than that on a section with conventional trench-type design.

Long-time county records in Iowa show that the annual loss of material from a typical gravel road is 80 cubic yards per mile. BPR figures for the whole country show an average of from ¼ to ½ inch of surface lost per year on roads of this type. Chlorides can be used to reduce this loss, alleviate dust, and reduce blading costs: their ap-

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plication is economically justified in most cases when traffic exceeds about 100 vehicles per day.

The provision of stable shoulders of adequate width on existing and planned highways should be an objective for all of us. Inadequate or unsafe shoulders provide a hazard to the traveling public and seriously reduce the capacity of the traveled way.

**Miscellany:** It is expected that 53 million vehicles will be registered in the United States by the end of the year; California is likely to be the first state to have more than 5 million registrations. . . . The annual meeting of the Highway Research Board will be held in Washington, January 13-16, inclusive.

• • •

## DOC SYMONS

(*Continued from page 18*)

were teamed Mrs. Bender won $30.— As I heard it.

★ ★ ★

**The Profession's Loss** — Just as I started to write this column, word came that my own water works superintendent, William E. Thrasher had died as the result of an unusual accident. He had worked all night on a main cleaning job for the Westchester Joint Water Works No. 1, of which he had been superintendent for 18 years. When he returned home for breakfast, he fell off his back porch and died shortly thereafter. Both in life and in death, Mr. Thrasher typified the water works man and his devotion to his job. "Bill" was undoubtedly a casualty of his work.

★ ★ ★

**News Notes From Brushy Bend** —The Northeast Section joined the Northwest Section of the Ohio Sew. and Ind. Waste Conf. last Sept. 18 to visit the Wellington, Ohio Sewage Works.—Roast Turkey was served later at the Oberlin Inn for $2.00 per plate plus tax.

The Northeastern Ohio Conference on Sew. and Ind. Waste Treatment held its fifth and final meeting of the year on Oct. 23 at the Southerly Treatment plant in Cleveland. Dinner included ham and all the trimmings served by an experienced ladies' group at the Cuyahoga Heights City Hall for $1.75 including tips and tax. New officers were elected.

The Central Ohio Section of the Ohio Sew. and Ind. Waste Treat. Conf. has drafted a new constitution to unify its sections with those of the parent organization. The constitution of the Southwest Section was used as the example. Norman D. Jaynes is Secretary.

★ ★ ★

**I Read Somewhere** — That A. J. Krell, whom I knew in Buffalo and who has been in Texas for some years, is now Field Director for the application of "Bionetics",—"a dry stable powder of groups of preserved living micro-organisms from natural sources, with enzyme systems and trace minerals to improve and accelerate biological processes," particularly for the improvement of sewage treatment processes. There's an article in this issue on using "Bionetics" in Houston.

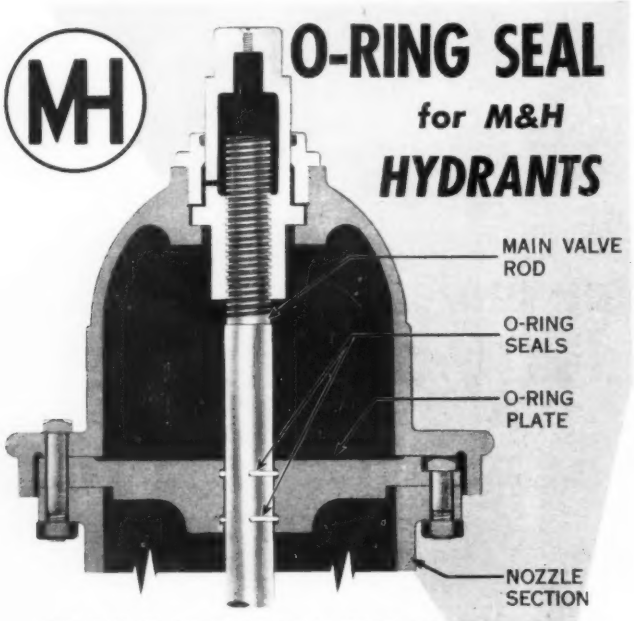
**If This Be News** — It's time to send in your reservations for the AWWA Convention in Grand Rapids, Mich., to be held May 10-15, 1953.

Already ? ? ?—Why, I haven't yet forgotten the wonderful Convention we had in May in Kansas City! ! !

★ ★ ★

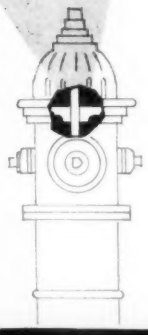
See You Next Month—with more stories about P.I.P.

V.T.Y.—*Doc Symons*


M & H Hydrants can be furnished with Rubber O-Rings Seals if desired. The Seal Plate and O-Rings replace the conventional design of stuffing box, gland and packing. O-Ring Seal Plates can also be supplied for hydrants in service.

The Seal Plate contains two rubber O-Rings. These O-Rings Seals are tight and leakproof and require little or no maintenance. Both O-Rings are made of a special compounded rubber plastic which does not deteriorate. Replacement of the O-Rings is a simple and easy operation, however, if it should become necessary. For complete information, write or wire M & H VALVE and FITTINGS COMPANY, Anniston, Alabama.



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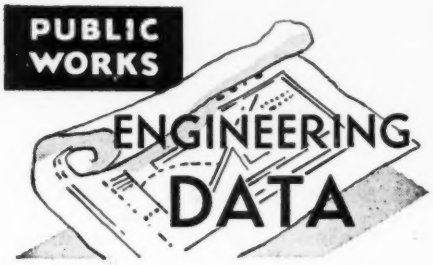


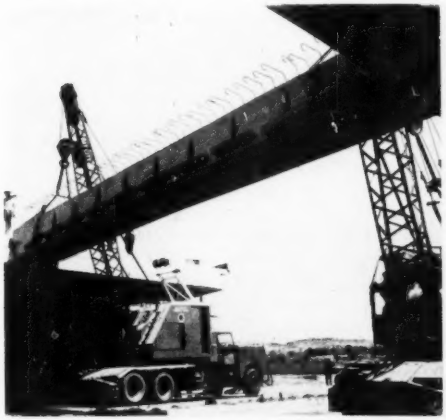

### Reinforced Concrete Box Girders Solve 4 Problems

FOUR major problems were solved in construction of the new Camino del Rio overpass spanning Mission Valley Road in San Diego by pre-casting 14 reinforced concrete box girders and then swinging them into place on pre-constructed supporting structures on either side of the highway. The design was by Joseph Kershaw, senior structural engineer in the San Diego City Engineer's office. When he undertook the job, he was faced with these problems:

1. Traffic on the heavily travelled link between the East San Diego and beach areas could not be interrupted during the construction; (2) there was insufficient room on either side of the highway for the necessary form structures, scaffolding and work space without prolonged interruption of traffic; (3) there could be no middle-of-the-highway support for the overpass; and (4) distance between grades had to be held to a very minimum.

Faced with these restrictions, Kershaw thought of a cantilever type construction, in which reinforced concrete hollow box type girders would be pre-cast on the ground by the contractor, M. H. Golden Construction Co., of San Diego. The abutments were designed with partial eccentric cantilevers of 13-ft. extensions to hinges, or steps, on which the girder would rest. When ready, the girders would be swung into place by use of two mobile cranes.

Each girder is 56 feet long and 6 feet wide and



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weighed 38 tons. The overpass has an overall length of 93 feet 6 inches, with a deck 85 feet 6 inches wide. The structure rests on 70-foot long concrete piling and each abutment has 92 piles.

Of special interest was the "C" shaped type of concrete abutment supporting the pre-cast concrete suspended span. This reduced the length of the suspended span, thus reducing its depth and weight. The former permitted a lower grade line and the latter facilitated lifting it into place over traffic.

Traffic continued to use the Mission Valley Road during the entire construction period, and was detoured for less than 15 hours on three different days —6 hours on each of two days and less than 3 hours on a third. This was done during the off-peak periods of the day, and the highway was open for capacity use during morning and afternoon peak hours.

The overpass is part of a project that includes a new bridge over the San Diego River and a traffic cloverleaf to eliminate left turns at the intersection of Mission Valley Road and Morena Boulevard. When completed this fall the project is expected to eliminate 90 percent or more of the congestion that now backs up cars for blocks during rush periods.

• • •

### Cost of Laying Water Mains in St. Louis, Mo.

Cost data on water main construction is recorded in the 1951-52 annual report of the St. Louis, Mo., Water Department, of which Thomas J. Skinker is Commissioner. These data cover 6, 8 and 12-inch pipe primarily. The costs given here are average costs, covering both difficult and relatively simple jobs, which varied from 100 per cent hand excavation and 100 per cent hand backfill to 99 per cent machine trenching and 96 per cent machine backfill.

6-inch Pipe.—Averages covering 25 separate jobs, based on 11,793 ft. total length, with 22 hydrants and 45 valves included, show an overall cost of $4.38 per foot. The smallest job involved 70 ft. of pipe; the longest one 1,210 ft.

8-inch Pipe.—There were 39 jobs tabulated, totalling 19,880 ft. of pipe, 39 hydrants and 79 valves. The average cost per foot was $5.87. The shortest job was 80 ft. long; the longest in this group was 1,476 ft.

12-inch Pipe.—The eight jobs included in the average ranged from 364 to 3,546 ft. in length, totalling 8,665 ft., with 11 hydrants and 31 valves. Average cost per foot was $9.485. The largest job, with 6 hydrants and 12 valves, averaged about $8 per ft. in cost.

• • •

### The Cost of Laying Water Pipe in Hartford

According to the 1951 report of the Hartford, Conn., Water Bureau, the cost per foot for laying water pipe, including trenching by machine, was as follows: For 6-inch, 1,132 ft., a total of $4.49 per ft., of which labor was 65 cents, materials $2.00 and other items $1.84. On 42,549 ft. of 8-inch, corresponding costs were $4.695, $1.112, $2.655 and $0.927. On 14,112 ft. of 12-inch, costs were $7.093, total; $1.255 for labor; $4.370 for materials; and $1.468 for miscellaneous. The cost per foot for 894 ft. of 16-inch was $9.236.

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# PUBLIC WORKS DIGESTS

THIS section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are Bibliographies of all principal articles in these publications.

SEWERAGE AND REFUSE . . 101
HIGHWAYS AND AIRPORTS . . 109
WATER WORKS . . 115

## THE SEWERAGE AND REFUSE DIGEST

### Corrosion in Sewage Plants

At the Back River sewage treatment works of Baltimore, many corrosion problems have been encountered during the 40 years of its operation. Copper gutters and rain leaders, copper screens, bronze fittings inside vacuum filters, steel lamp posts and steel gratings were corroded; some had to be replaced in a few years. In an effort to find materials which would resist this corrosion, tests covering a period of 4 years were made of stainless steels, aluminum, Monel and Inconel nickel alloys, copper and four grades of iron and steel. From these tests it was concluded that 1). In damp atmospheres containing hydrogen sulfide, or in enclosures above septic sewage, raw sludge, or digested sludge, the following metals showed little or no attack at the end of 18 months: stainless steel, types 410, 430, 304 and 316; aluminum 17 ST; and nickel alloys, Monel metal and Inconel metal.

2). In damp atmospheres containing free chlorine none of the metals tested proved satisfactory.

3). Stainless steels that proved satisfactory after 31 months of exposure in direct contact with digested sewage sludge coagulated with chlorinated copperas included Types 317 and 316, and Armco 17-14 Cu. Mo.

4). Stainless steels that proved satisfactory after 31 months of frequent exposure to the spillage of freshly dewatered vacuum filtered sludge cake included Armco 17-7 PH and type 304. Results almost as satisfactory were obtained with Type 431 and Armco 17-4 PH.

C. E. Keefer and Kenneth M. Huston—"Corrosion Studies and the Use of Stainless Steel at the Back River Sewage Treatment Works, Baltimore, Md.;" *Sewage and Industrial Wastes*, October.

### Treating Wool Scouring Wastes

Rochelle, Ill. in 1936 rebuilt and enlarged its old treatment plant, converting it into a mechanical activated sludge plant, including pre-aeration and digestion. The sewage contained large quantities of dye and wool scouring wastes, and it was intended to separate out the grease brought by the latter by pre-aeration and skimming. It at once became evident that the new plant would not handle the wool wastes: although they constituted only about 3.6% of the total sewage, they contained 12,000 ppm of suspended solids and 15,000 ppm of BOD. The grease was carried over into the aeration tanks and upset their operation. The wool wastes therefore were discharged untreated into the Kyte Creek. The resulting pollution of the creek, increasing as the industries expanded, caused the State Sanitary Water Board to bring increasing pressure on the city to provide a remedy: and in 1950 the city retained an engineering firm to prepare plans for this. The plan they proposed is now nearing completion. It provides for treating the sanitary sewage and dye wastes together by activated sludge: and handling the grease scouring wastes separately, giving them no treatment except direct digestion.

The sewer which had received the wastes from the two industries had insufficient capacity, and the two classes of waste are brought to the plant through new sewers, one for each waste, 2670 ft. long. Both wastes are relatively warm, and these two sewers were constructed in intimate contact in order that the wool wastes might be assisted in maintaining a sufficiently high temperature in winter by the dye wastes, which have more than ten times the volume of flow. The wool wastes go to a primary digester of 25,700 cu. ft. capacity, providing theoretically 7.7 days detention; and from this to a secondary digester of 11,100 cu. ft. capacity. Operation experience may indicate more satisfactory digestion results by combining the wool wastes in some proportion with the domestic sewage and dye waste sludge.

A. V. Van Breda—"Special Treatment for Industrial Wastes at a City Plant:" *PUBLIC WORKS*: November.

### Garbage Composting At Bay Shore, N. Y.

Bay Shore disposes of its combustible refuse in an incinerator, the residue and other non-combustibles in a dump, and the organic refuse by composting; all located at one site. The composting is performed by a private company, which is paid $1 a ton for all garbage received, and which sells the compost for fertilizer at $68 a ton, and obtains some income from paper, rags and metal sorted from the garbage. In composting, the garbage is ground, mixed with manure, and

dropped into a digester—a wood structure 14 ft. square and 40 ft. high, divided into four zones by horizontal steel grates. Heated air is forced by a compressor into the bottom of the digester and rises through the four zones. Garbage remains on the top grate for 24 hr.; then is raked through this grate into Zone 2, where it remains for 24 to 48 hr. and heats up to 170-175°, due to the action of aerobic bacteria. It is dropped from Zone 2 to Zones 3 and 4 and, at the seventh day, to the bottom pit, from which it is removed, dried, screened and bagged. About 10%, too coarse to pass the screen, is returned to the digester to serve as bacterial seeding. This is the first full-scale installation of this, the Frazer-Eweson process, and produces 10 tons of compost a day.

"Garbage to Compost, 7 Days:" *Engineering News-Record*, Nov. 6.

### Household Activated Sludge Plants

Substitutes are needed for the 11 million privies still in use in the United States. Septic tanks with absorptive fields are impracticable for some soils. Prof. Don E. Bloodgood considered the possibility of family-size activated sludge plants. Experiments showed that it was necessary to grind the solids in the sewage, and Hal McPherson, maker of grinder toilets for trailers, was interested and furnished funds for studying the idea by the Purdue Research Foundation. Tests were continued for nearly two years. The sewage was discharged into a tank divided into a 175-gal. aeration compartment and a 52-gal. settling compartment. Compressed air came through standard diffuser tubes. At first, effluent went to the drain; but in the third part of the test, for 175 days, it was circulated by a pump and used as flush water. During the last three weeks of the test air was supplied by drawing it into the pump discharge with an aspirator or into the pump suction by a flutter valve, instead of using a compressor. There were no odors. The solids were reduced 94.7%. No information was collected on cost of operation, nor was the optimum size of tank determined.

"A Brand New Threat to the Privy:" *Engineering News-Record*, Oct. 30.

### Chlorine Residuals And Median MPN

Studies conducted at six plants treating New York City's sewage showed that the same residual chlorine content (as measured by the orthotolidine test) in different sewage plant effluents does not effect a similar reduction in coliform density as measured by the median MPN. The results suggest that in actual plant practice the amount of chlorine (measured by the orthotolidine residual) required for reduction of coliform density to a predetermined concentration (measured by the median MPN) is dependent on the pretreatment of the sewage. Effluents from secondary treatment plants require less residual chlorine than do effluents from primary treatment plants. Raw sewage requires even more than primary plant effluent and it may not be practicable to reduce the median MPN of coliform bacteria in raw sewage to less than 2400 per 100 ml by chlorination.

Wallace W. Sanderson—"A Study of Sewage Chlorination in the New York City Metropolitan Area;" *Sewage and Industrial Wastes*, October.


NOTES
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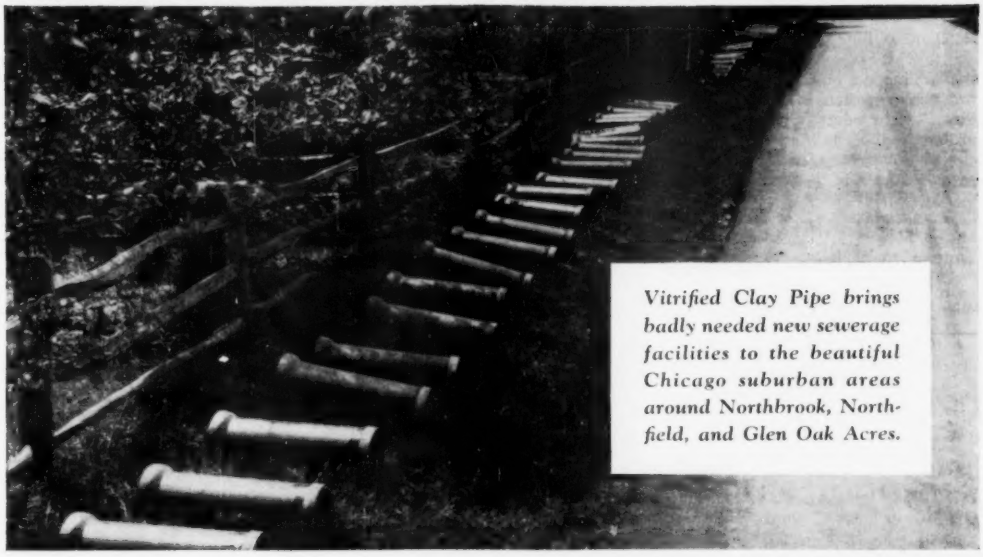

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| Rapid City, S. D. (Air Force Base) | 54,000 ft. |
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### Techniques Used in Testing Industrial Wastes

In the Los Angeles outfall, which is 52 miles long, the long confinement of the warm sewage favors the production of conditions which produce corrosion of concrete and disagreeable odors. Studies of the problem thereby presented included thousands of analyses of the sewage and the industrial wastes discharged into it, and several new devices were developed for facilitating this work. Use of a Perkin-Elmer flame photometer has reduced the time consumed in determining sodium and potassium to a small fraction of that previously required. Use of the infrared spectrophotometer makes possible the identification and measurement of small quantities of organic wastes not determinable by ordinary laboratory methods. To determine the rate of attack of sewer gas on the concrete walls of the sewer, pear-shaped concrete balls are hung in manholes and periodic examinations of these give data from which the life of the sewer can be computed, and by which the points of high corrosion can be located. These balls are also used in evaluating protective coatings. It was learned that ventilation of sewers through manholes reduced corrosion and obnoxious odors and retarded development of septicity: but removal of odor from the air discharged is necessary where mechanical ventilation is installed. In studying the odor problem, a new method is being tried; odor-producing constituents are being frozen out of the sewer gas and the various fractions subsequently analyzed. One of the odors was analyzed with the infrared spectrophotometer and proved to be pyridine.

N. J. Krotinger—"Laboratory Organization and Techniques for Large-Scale Sewage and Industrial Waste Testing;" *Sewage and Industrial Wastes*, October.

## Fluoridation Experiences in Washington, D. C.

IN preparation for fluoridating the Washington, D. C., water supply considerable study and preparation were required. This was outlined in a paper by Norman E. Jackson, Chief, Dalecarlia Section, Washington Aqueduct, which was presented at the Engineering Section of the American Public Health Association meeting in October, 1952. Sodium silicofluoride was selected as the chemical to be used because its use fitted most advantageously into existing plant facilities, it was widely available and it appeared more economical for a large installation—the average water demand is 176 mgd.

It was decided to install the equipment at the Dalecarlia plant, where the flow is 71 mgd and to feed the fluoride solution into the raw water line to the McMillan plant, which handles 105 mgd average flow. A complicating factor was the application into this line, just below where the fluoride solution would be introduced, of an average alum dosage of 165 pounds per million gallons, or 1.16 gpg. Laboratory tests indicated that with this alum feed, a 7 per cent to 10 per cent loss of fluoride would result; while with higher alum applications, 2.74 to 2.93 gpg, fluoride loss would be 25 per cent to 30 per cent. Experience since the plant was put into operation indicates that these figures are valid.

A Dracco pneumatic conveyor system was installed for handling the chemical. It was decided to have this shipped in 350-pound drums. Storage bins to hold 125 tons were available, but it was found that even with 20 to 30 tons in the bins, lumping of the material started in about a month, causing an uneven application of feed. Storage has been reduced to 10 to 15 tons and the flow-through time to 6 to 8 days, with the result that lumping has ceased. The Dracco conveyor has proved very satisfactory in eliminating dust problems and reducing health hazards.

Dry feed machines are of the Merchen weighing type, furnished by Wallace & Tiernan. Solution tank design was based on the solubility of sodium silicofluoride over a solution water temperature of 34°F to 80°F and a minimum detention time of the solution in the tank of about 15 minutes. Using these criteria, a solution tank size of 500 gals. each was established. After considerable study, it was decided to line these tanks with polythene, which is readily and uniformly applied. Plastic piping was considered for the piping layout, but it was finally decided to use rubber-lined steel elbows from the tanks, to use hard rubber pipe to outside the building, and then use flexible plastic piping.

Loss of fluoride due to adsorption in reservoirs and in the distribution system appears to be inconsequential.

Workmen engaged in fluoride handling are supplied with launderable cotton overalls, rubber-impregnated fabric gloves, a suitable respirator, full-view goggles and a cotton skull cap. Though the conveying equipment used has practically eliminated dust, it is felt that the additional precautions for personnel protection should be provided.

### Handling Chemicals With Pneumatic Conveyors

By purchasing chemicals in bulk a considerable saving can be made in purchase price and in some cases in handling also. In transferring bulk chemicals from car or truck to bins in the plant, pneumatic conveyors offer decided advantages for handling almost any reasonably dry, granular or powdered material. Using this system, one-man operation is normal; there is no danger from exposed moving parts or dust; no material is wasted; cost of maintenance and upkeep are low; and the system provides versatile handling and application flexibility, and dependable service without failures or shut-downs. The conveying lines occupy little space and can follow any course, horizontally or vertically, in the plant, and for any distance from the transporting car or truck to the plant. At Adrian, Mich., the chemicals are conveyed 1100 ft. from a railroad siding, including a river crossing, at the rate of 5 tons an hour. The Hamilton, Ohio, water works is still using a conveying line that has been buried for over 17 years and has never had to be cleaned.

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Santa Monica Builds a Double-Grate Incinera-

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• • •

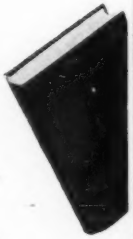
## Seattle Sanitary Fill

(*Continued from page* 79)

tent for fill cover. A slight grade must be maintained constantly to avoid ponding of water.

"Seattle probably has a greater percentage of wet garbage than most large cities," W. R. Johnson said. "By that I don't mean it's because its gets rained on before it's picked up. It's mainly because of the large number of truck farms in the vicinity, the long garden crop season and the preponderance of locally grown vegetables. Great amounts of lettuce leaves, carrot tops and similar vegetable particles probably account for better and faster compaction in our fills," Johnson added.


**How to overcome industrial waste problems economically and effectively**



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This working guide helps you launch and carry through a practical program of solution at a minimum cost and maximum results. In it the component factors and economical aspects of the waste problem are discussed, enabling you to properly evaluate them and arrive at a successful solution. It summarizes the functions and jurisdiction of various agencies as well as the laws controlling discharge of wastes into streams.

Tells how to:

- determine the degree of treatment required
- determine the volume of waste
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- treat dairy wastes
- treat wastes from fermentation industries
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The methods, treatment plants, and units of equipment available for waste treatment are described, with numerous flow diagrams and photos showing their successful use. To minimize stream pollution and reduce costs of treatment, the book points up considerations of plant design and construction and techniques of reclaiming byproducts from industrial wastes. A wealth of background information—working methods and data you can use to profit, are embraced in this single volume.

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Other city departments work with Engineering on the Seattle sanitary fill effort. The Public Health Department has a Plague and Vermin Control branch which makes periodic checks on the fills and carries on extermination campaigns when necessary. The Engineering Department also works closely with city planners in deciding upon final uses for completed landfill areas.

The present fills, for instance, are being considered for such varied uses as park areas, a helicopter landing field, parking lots and a golf course at the University of Washington. Already Seattle boasts libraries, school board buildings, an athletic field house, parking lots and numerous warehouses and other commercial buildings on previously useless land reclaimed through use of sanitary fills.

The value of good public relations has also been recognized by the Seattle City Engineer for easing garbage collection and disposal difficulties. The department is currently issuing a series of public information pamphlets to point out various phases of its work. A special garbage and refuse pamphlet has been prepared and distributed to the citizenry to explain the problems involved, to describe the city ordinance, to define the meanings of garbage, refuse, trade waste, etc. Similarly, newspaper releases are used to tell Seattleites just what is going on, how fill lands will be used, as well as other details of garbage collection and disposal, something the average citizen has always taken merely for granted.

Department officials believe such a program will ultimately give the people of Seattle a greater realization of the magnitude of this collection and disposal task and a greater appreciation of the work being done.

• • •

## Industrial Wastes

(*Continued from page 76*)

employs aeration plus vacuum to cause the grease and light solids to separate at the top of the tank. These solids are then sent directly to digestion and do not affect the oxidation units following.

The effects of the elements of certain types of wastes on public utilities are shown in Table I.

### *The Re-Use of Treated Effluents*

Frequently the location of an industry which uses large volumes of water may impose a serious drain on the normal water supply facilities of a community. Table II shows the water demands of certain common industries.

In many areas water is becoming more and more a scarce commodity and extra demands upon the diminishing supply are looked upon askance. Water is essential to human life and the demands of industry must be carefully scrutinized before the normal amount required by the human population is seriously depleted. Due to population concentrations it is not always possible to secure additional sources of supply and it is frequently necessary for cities to expend enormous sums to go into other watersheds to obtain a satisfactory volume. This is exemplified by the City of New York, which not only has been forced to drill tunnels through mountains, but has had to go into the water sheds of adjoining states to secure the water needed for its people, and also to construct expensive additional facilities for obtaining water from the Hudson River in times of emergency.


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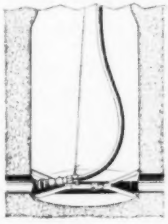

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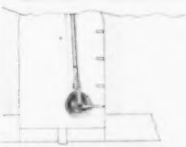

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Now's the time to mail this month's Readers' Service card.

Too little attention and thought has been given to the fact that we are very extravagant in our usage of water. In practically every instance water is used but once. It passes through our homes and is contaminated by its use for kitchen and toilet purposes and then normally passes out to a stream. It may be that this same water, after treatment and purification may be used by another community downstream but even so, it is again used only once by the inhabitants of that community.

This extravagant usage means that every day an equal amount of water must be taken from a stream to supply the demands. We are prone to figure that in the average community a person requires one hundred gallons of water per day. True, an average person, in his normal household and personal duties does not actually use this much, but this in most cases takes care of the usage in hotels by transients and the average other purposes such as watering lawns, washing cars, laundry purposes, and also covers small industrial uses. In many of the large cities this water usage is very much exaggerated as is shown in Table No. III, which gives data for 24 cities.

A very small volume of this water is actually polluted to the extent that it becomes useless for further demands; but because it is all put down the same drains and sewer pipes it all becomes subject to suspicion and is thrown away. Much of the industrial water is not contaminated. Power plants require large volumes of cooling waters. These waters are not contaminated and in many cases these tremendous volumes are discharged into the nearest streams. Due to lack of available water sources many such industrial users of water are installing cooling towers and reuse this water many times over. Other waste water, such as that used to wash raw materials in many types of plants, are not contaminated beyond recall and could be reclaimed.

In certain sections of the United States, particularly in the Far West where water supplies are dwindling and populations concentrating, thought has been given to means of obtaining additional water. This has followed two lines; one, that of reclaiming the waste waters of industry and recharging the underground sources; and two, the treatment of the waters of the sea to render them potable and useful for industry. The first named seems to have the most promise practically and the work done by A. M. Rawn of Los Angeles as exemplified in his report (1) is worthy of serious consideration as is also other work along the same line in California (2) and (4). The second idea, reclamation of sea water, seems to be further in the future, as economically no means of removing the salt content of sea water sufficiently to render it palatable, has been developed. The United States government has appropriated a considerable sum of money for this purpose. Although several plans of ionic treatment and synthetic resin demineralization have been developed the cost of such water is still beyond the reach of general application.

However, the treatment of sewage and industrial wastes for the reclamation of the liquid portion for reuse in certain ways must not be neglected and is not beyond the economic facilities of municipalities and industries. It is true that public health officials would want absolute assurance of the sanitary qualities of such reclaimed water before permitting their use for potable purposes and justly so; but there are many other uses to which reclaimed water can be put that offer perfect safety. These include: cooling purposes, street washing, fire protection and reuse in industry for purposes not coming into contact with foods. In some cases this would entail the use of separate piping systems, but this would not be an inordinate expense in an industrial plant.

An outstanding example of an industrial installation which employed this principle to a high degree is that of the Kaiser Steel Co. at Fontana, California (3). Water at this plant was at a premium and as the steel plant required enormous volumes for cooling and other purpose, the engineers were charged with the responsibility of recovering all liquid effluents for reuse in the mills. This included the cooling waters from which ash was removed; the quenching waters from the mills; the pickling liquors; and the sewage from the mill population. Adequate plants for the treatment of the pickling liquors and sewage were installed and also special types of settling basins to remove the ash from the cooling and mill waters.

It is the writer's opinion that mature consideration should be given to this re-use of water in the future. Many communities may be able to benefit more by this local application of modern engineering means than by going further and further afield for new and expensive sources of supply.

**Table III—Water Consumption in American Cities**

| City | Consumption, gpcd |
|---|---|
| Akron, Ohio | 98.6 |
| Atlanta, Georgia | 85.0 |
| Atlantic City, N. J. | 66.0 |
| Baltimore, Md. | 150.0 |
| Buffalo, N. Y. | 204.0 |
| Cleveland, Ohio | 136.0 |
| Chicago, Ill. | 244.5 |
| Cincinnati, Ohio | 90.5 |
| Dallas, Texas | 92.3 |
| Detroit, Mich. | 119.2 |
| Honolulu, Hawaii | 137.0 |
| Indianapolis, Ind. | 91.9 |
| Kansas City, Mo. | 96.2 |
| Los Angeles, Calif. | 156.0 |
| Louisville, Ky. | 118.1 |
| Miami, Florida | 92.5 |
| Milwaukee, Wisc. | 144.3 |
| New Haven, Conn. | 135.2 |
| New Orleans, La. | 91.9 |
| New York, N. Y. | 146.0 |
| Philadelphia, Pa. | 112.2 |
| San Francisco, Calif. | 109.0 |
| St. Louis, Mo. | 140.0 |
| Washington, D. C. | 79.3 |

Abstracted from "A Survey of Operating Data from Waterworks in 1945" Journal Am.W.W. Assoc., Vol. 40, p. 165, Feb. 1948.

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# PUBLIC WORKS DIGESTS

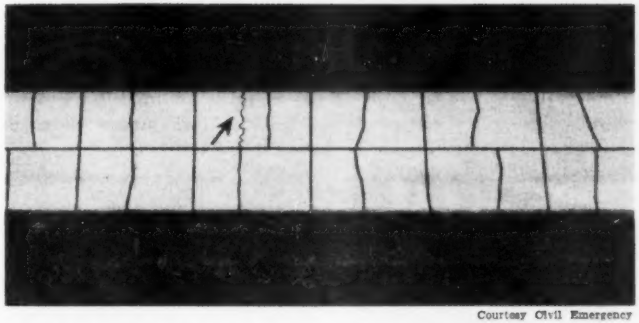
## THE HIGHWAY AND AIRPORT DIGEST

### Aerial Surveys Of Pavement Condition

The Univ. of Nebraska and the Nebraska Dept. of Roads have conducted a study to determine the practicability of making aerial photographs of pavements that would show cracks and other defects in need of treatment, and the techniques and procedure in taking such photographs that would bring out the maximum surface details. A ground survey to locate cracks and other defects in pavements would probably cost $75 to $100 per mile, while obtaining a photographic record which is sure to be more complete, would cost from $8 to $10 per mile on a 5-in. photographic negative, and using a 35 mm camera would reduce the cost 20 to 25%.

In these Tests, Super XX film was used, exposures were 1/500 sec. The best F-stop setting was between F 4.5 and 6.3. Negatives taken at a height of 500 ft. showed all pavement defects that had been treated, but not untreated defects; for the latter an elevation of 300 to 350 ft. above the pavement was selected. The best results were obtained in bright sunlight when the sun was from one to two hours on either side of the meridian, because of the shadows cast. The cost of making prints from the negatives is considerable and it would be possible to project the negatives on a screen for study; this brings out the details as well as prints.

Adrian R. Legault and Howard M. McMaster—"Aerial Photographs Facilitate Surveys of Pavement Condition;" *Civil Engineering*, October.



Courtesy Civil Emergency

● **Aerial photograph taken at 350-ft. elevation shows untreated crack (arrow).**

### Fingerprinting Highways

In making skid-resistance studies of pavements, engineers of the California Div. of Highways took close-up photographs of pavement texture, but found it impossible to obtain a true picture of this because of variables of lighting and differences of coloring of the aggregates. This problem they solved by making plaster-of-Paris "negatives" of 12″x12″ areas of the pavement, making plaster "positives" from these, and photographing them under controlled lighting. These casts were often quite revealing, showing that surface textures are often very similar even though they appeared to be quite different when looked at on the road. In making these casts, a frame of 1-in. wood with a 12″ x 12″ opening was laid on the pavement, on a spot that had been thoroughly cleaned and covered with lubricating oil, and filled with a plaster-of-Paris. This sets enough to be removed in about 40 minutes.

M. L. Nelson—"Fingerprinting a Highway;" *California Highways*, October.

### Stripes on Pavements

The Texas Highway Dept. has for a number of years been making pavement markings of the asphalt "built up" type, produced by laying a binder layer of asphalt cement and covering it with a layer of uniformly graded aggregate. Using limestone aggregate, it has good visibility by day but poor by night; also no naturally yellow stone is available for producing yellow stripes. These "built up" stripes are quite durable, and a study of other thick-film stripes has been made by the Texas Engineering Experiment Station to see if better ones of this type were not available. They studied paint stripes over both plastic and asphalt adhesive films; hot-melt plastic stripes using British-developed rosin and rosin-alkyd resin; preformed plastic strips about 0.1 in. thick bonded to the pavement with plastic adhesives; pigmented bitumen stripes; and asphalt "build-up" stripes coated with pigmented portland cement mortar; and four traffic paints. These were placed on well-traveled pavements of both asphalt and concrete.

The adhesive films under paint stripes tried in this project did not improve the durability and visibility of the paint strips. Rosin compound stripes and preformed plastic strips had much better durability on asphaltic concrete pavement than did thin paint stripes. On concrete pavements, durability of each type of stripe was directly related

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to the retention of ductility by the portion of the stripe film in contact with the pavement. Preformed plastic strips and rosin-alkyd stripes had better durability under the conditions of these tests than did the other types of stripes tested. The day visibility of the beaded rosin-alkyd resin stripes and the integrally beaded plastic strips was better than that of beaded paint stripes and beaded paint stripes over asphalt adhesive films. The day visibility of unbeaded yellow paint stripes was better than unbeaded yellow rosin compound stripes. Unbeaded white rosin compound stripes had better day visibility than unbeaded white paint stripes. All beaded lines had better night visibility than unbeaded lines. The unbeaded rosin compound stripes, because of their greater elevation above the pavement, had better night visibility than unbeaded paint stripes.

In summation, paints are surpassed as marking materials (1) on asphalt pavements by preformed plastic strips, British rosin compounds, and rosin-alkyd resin compounds, and (2) on concrete pavements by preformed plastic strips and rosin-alkyd resin compounds.

Charles J. Keene—"New Stripe Materials Better Than Paint;" *Roads and Streets*, October.

### Correcting Slick Asphalt Pavements

In a stretch of 3-course asphalt surface over old concrete pavement on route U. S. 9W, considerable areas with excess asphalt on the surface appeared recently. Attempts to scrape off the excess asphalt with ice-removing tools were unsuccessful. Then spots were heated with blow torches, and ¼ to ⅛ in. stone, heated to 250° to 300°, was spread and rolled. This was fairly successful, but some of the stone was thrown off by traffic, and the patches were white. Final success was obtained by precoating the stone with asphalt in a mixing plant, using 1¼% of asphalt by weight, and spreading this immediately behind the blow torch and rolling it at once.

George E. Martin—"How to Correct Slick Spots;" *PUBLIC WORKS*, November.

### Use of Fly Ash in Concrete

Baltimore, Md. is experimenting with the use in concrete of fly ash produced by burning pulverized bituminous coal in power-producing boilers. Advantages claimed for such use include greater strength after 100 ± days, as the ash combines with the free lime released as the portland cement hardens; also reduction of effervescence. It increases density by filling voids in the sand; and produces low heat of hydration. It reduces the amount of air that can be entrained; whether it will give resistance to freezing and salt equal to that of air entraining is not known. The city in 1950 built two adjacent stretches of concrete pavement, using 6½ bags of cement in one case and 5½ bags of cement and one bag of ash in the other. The former entrained 3½% of air; the latter averaged 2½% and required a longer mixing period. Test cylinders showed the fly-ash concrete to average 685 lb. less compressive strength at 6 days, but 635 lb. greater strength at 28 days and approximately the same at 360 days. On the whole, the highway department thinks it better to sacrifice this greater strength for the greater durability obtained by air entrainment. On the other hand, the Bureau of Water Supply prefers use of fly ash because of the greater density, greater strength, lower heat of hydration, and reduction of effervescence.

William Leonard Chilcote—"Where to Use Fly Ash;" *American City*, October.

### Cement Stabilization Of Heavy Clay Soils

A study of the value and practicability of stabilizing heavy clay soils with cement has been made jointly by the English Dept. of Scientific and Industrial Research and the Ministry of Supply. A laboratory investigation was made, using heavy clay with a liquid limit of 70-75% and a plastic limit of 22-25%. Adequate strengths were obtained with all portland cement contents ranging from 10 to 40% if cured for 7 days in a damp atmosphere. If immersed in water for 5 of the 7 curing days, greater strengths were obtained for cement contents exceeding 20% and still greater if 2% of hydrated lime was added. This indicated that such a mixture would give a material suitable for road foundations. But when it came to practical construction, they could find no mixing equipment that would give a satisfactory result. The rotary tillers tried would not break the clay into small enough sizes. Asphalt mixers and pottery-type

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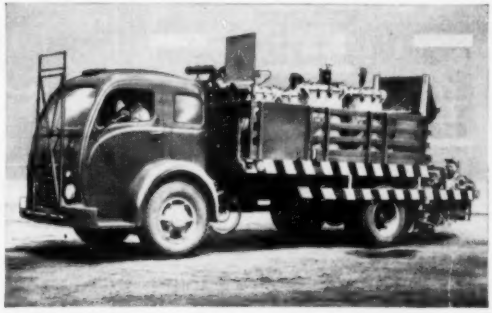
## *White 3000* MANEUVERABILITY SPEEDS TRAFFIC LINE MARKING

**DES MOINES**—Here's an application that takes full advantage of the outstanding maneuverability of the White 3000. An "intercom" system between driver and spray operator on this White equipped with traffic line marking equipment saves slips on this unique application. When traffic or paint require quick stops or turn-outs, driver responds instantly and time is saved on the job all day long . . . more work done!



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mixers were tried, but various modifications, and the pottery-type found to be the better; but the output was low. It was estimated that the cost of a stabilized clay layer 12 in. thick would be about 12 shillings ($1.68) a square yard.

D. J. Maclean, P. J. Robinson and S. B. Webb—"An Investigation of the Stabilization of a Heavy Clay Soil with Cement for Road Base Construction;" *Roads and Road Construction*, October.

### Street Construction With Department Personnel

For over two years, Union City, Tenn. has not contracted any type of utility construction. Using department personnel and purchased or rented equipment, it has constructed 17,247 lin. ft. of curb and gutter, over five miles of pavement and over a mile of 8-in. sanitary sewer, all at costs considerably lower than costs by contracting paid by neighboring cities. The total cost for 21,663 sq. yd. of 6-in. soil-cement base has averaged 49 cts a square yard, including cement, labor, fuel, equipment rental, and curing. Equipment rental included 5 ct. per sq. yd. for a Seaman mixer; 0.5 ct. for a cement spreader, and 0.5 ct for a rubber-tired roller. In 1952 they bought a cement spreader and a pulvi-mixer. They already owned the two motor graders, a tandem roller and a number of trucks used on the work. Street department wages have been increased 40 to 100% during the past two years, enabling them to keep their experienced men.

W. D. Frizzell — "Municipally Owned Equipment Reduces Street Costs;" *PUBLIC WORKS*, November.

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Fingerprinting a Highway. By *M. L. Nelson*, Ass't. Physical Testing Engr. October, Pp. 29-30.
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Hot Patching Mixtures as Used in State Highway Maintenance. October, Pp. 87-88, 90.

• • •

### Waterproofing Concrete Block Buildings

Concrete blocks are advantageous for certain types of buildings and are economical. However, a driving rain may bring moisture through the walls, causing lots of trouble unless the walls are properly waterproofed. The "Bitumastic Bulletin" of the Koppers Co., Inc., gives the following information regarding the use of Bitumastic products for such waterproofing:

Bituplastic No. 28 is an excellent waterproofing material for the purpose. Because it is thick and heavy bodied, it can be applied in much thicker films than ordinary paints without sagging or running. Each dried coat is customarily 3 to 5 times as thick as a coat of conventional paint. In spite of its heavy body it is easily applied—without heating—by brush or a pump type spray.

Bituplastic No. 28 is fire resistant on vertical surfaces. It will burn when in contact with a hot enough flame but will not support combustion. Furthermore, it does not sag or run at up to carbonization temperatures. This is important as flash fires have often turned into serious conflagrations when the heat caused by sagging and running of materials which were combustible and fed the flames.

This material dries without alligatoring or cracking when correctly applied. Because of its tar base, it is waterproof and also highly resistant to natural weathering agencies—sunlight, rain, snow, air and atmospheric heat—to many chemicals and chemical vapors and also to the spillage of petroleum products, such as gasoline, kerosene and lubricating oils. On account of these distinctive properties, it is used largely as a protective coating for metals—such as iron and steel—and also for concrete, as well as a water resisting medium on concrete blocks.

Being a water dispersion it should not be exposed to freezing conditions in the container, during application or while drying. After drying it will withstand temperature varying from minus 50°F to about 250° F.

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### Street Lighting

*(Continued from page 68)*

If readings are made for the purpose of checking performance after depreciation in service, the condition of the luminaires and lamps should be noted: the number of hours the lamps have burned and the current characteristics supplied to the individual lamps should be determined. Otherwise, the luminaires should be cleaned and seasoned, rated new lamps should be installed, and both lamps and luminaires properly adjusted. If improvement due to cleaning and maintenance is to be determined, measurement before and after

should be made. Discharge lamps should be operated for at least 30 minutes to reach normal operating temperature before measurements are made. Tests should be made in clear weather, with no moonlight, and with extraneous light at a minimum.

Test stations should be chosen carefully so as to represent correctly the illumination pattern. The area to be tested should be divided into an even number of equal rectangular areas. Readings are taken at the center of these test areas. Enough stations should be chosen so as to provide a reliable mean for the entire surface. The street should be divided into traffic lanes approximately 10 ft. wide and test areas selected in the center of the lanes and at about 10 ft. intervals longitudinally. In addition to the readings at the basic stations, measurements may be taken at points of special significance, as at curb lines or on sidewalks. A record should be made of all conditions that might influence interpretation of results.

### *Design Procedure*

In designing an installation, the following factors must be considered: (1) Character, speed and volume of vehicular traffic and volume of pedestrian traffic; (2) Use classification of the street; (3) width of streets and sidewalks and curb and driveway conditions; (4) type, color and reflectance characteristics of the street surface; (5) predominating type and character of use of buildings; (6) transportation facilities; (7) traffic lights, safety zones, stop and one-way streets, parking and other traffic lights; (8) location, height and spread of foliage of trees, and regulation and trimming of trees; and (9) concentration of crime.

It is usually helpful to prepare and mount a large map on which can be plotted the applicable factors listed above. This will provide a good basis for design and facilitate establishing an order of procedure of design. Often such design will start with the more important streets. Detail procedure is influenced also by the choice of the luminaires and lamp sizes. Traffic streets should have an illumination value of at least 0.8 footcandle. Business streets should be lighted in much the same way as traffic streets, but shorter spacings are desirable and a distribution pattern should be selected which will provide more light on sidewalks and building fronts.

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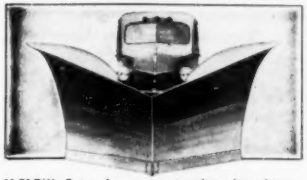

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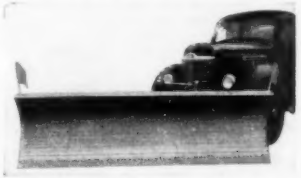

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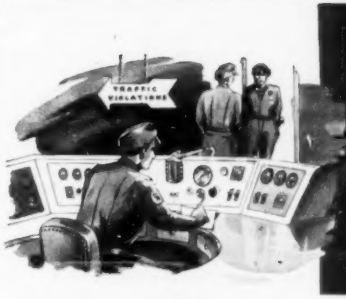


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Residential streets should be lighted for general protective and policing purposes. Illumination need not exceed 0.2 footcandles average on the street surface and 0.1 footcandle on the sidewalk. Consideration must be given to possible obstruction by trees, shrubbery and poles. Placing the lights as nearly as possible over the center of the streets may be advisable. Larger light sources, higher mountings and longer spacings may reduce maintenance cost while providing adequate illumination without glare and good appearance.

Intersections, curves, railroad crossings, bridges, tunnels and other similar places may need special treatment.

Due to the complexity of vehicular and pedestrian traffic at intersections, more illumination is required than for a street. In fact, it is good practice to provide at the average street intersection a level of illumination equal to the sum of the illumination values for the intersecting streets. A junction or T will require more illumination than that provided for either of the intersecting streets.

On curves, luminaires should be spaced closely on the outside of horizontal curves. In a series of horizontal curves, it will be necessary to change the luminaires from side to side to maintain this relationship. On vertical curves or hills, the problem is one of providing effective continuous overlapping of brightness areas. Closer spacing and proper tilting of luminaires with respect to the roadway is helpful.

Underpass illumination should provide lighting at least 50% greater than that for the entering and leaving roadways. Elevated and depressed roadways, railroad crossings, plazas and traffic circles, bridges, tunnels, alleys and streets having many trees are all special problems in which lighting design must be worked out with consideration for the existing situation.

In many of these special problems, location of the luminaries is important. This matter, as well as factors in lighting, intensity, is covered in detail in the Westinghouse booklet. Also covered are distribution systems, which may be series, multiple or a combination of the two, with a discussion of relative advantages and costs.

### *Other Design Factors*

In selecting the exact location for lighting units at an intersection, care should be exercised to prevent interference with pedestrians by the base of the pole. At business street intersections, lighting units should be placed in line with building fronts. On traffic thoroughfares or freeways, the lighting units should be at a sufficient distance from the curb line to minimize chances of accident—usually about 8 ft. minimum. On 4-lane roads with a median separation strip, it is better to place the lighting units on the outside than in the center strip; and where the overall width of the roadway, including the median strip, is not over one hundred feet, it is better to treat the area as a single roadway with the lighting units on the outside. If the median strip is wider than 30 ft. the two roadways should be considered as separate problems.

Floodlights may be of value when several parallel railroad tracks are to be crossed and it is not possible to locate lighting units on the railroad right-of-way.

Copies of this booklet may be obtained from Westinghouse Electric Corporation, Lighting Division, Cleveland, Ohio.

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# PUBLIC WORKS DIGESTS

## THE WATER WORKS DIGEST

### Fluoridation Of Water Supplies

Evanston, Ill., has been adding fluorine to the communal water supply since 1946 and a study of the effect on incidence of dental caries in children has been conducted by the dental and medical profession, health authorities and the University of Chicago. After 23-24 months, examinations of children of the 12, 13 and 14-year age group showed a reduction of approximately 12.9%. In 1951, after 47-58 months of exposure, examinations of 6, 7 and 8 yr. old children showed an average reduction of 46.42%.

Horace R. Frye and Iden N. Hill —"Water Fluoridation and Dental Research".

The authors conducted a study of the taste of fluoridated water, using 187 students who made a total of 12,177 comparisons of water containing different amounts of sodium fluoride with distilled water. They concluded that not one in a thousand persons can detect sodium fluoride in distilled water by the ionic effect at 1 ppm fluorine.

Gerald J. Cox and Jessica W. Nathans—"A Study of the Taste of Fluoridated Water;" *Journal, Am. Water Works Ass'n*, October.

### Calculating Yield of Ground Water Reservoirs

The determination of the future yield of groundwater reservoirs depends in part upon how successfully we can duplicate through mathematical processes the conditions of flow, recharge, discharge and storage that we observe or measure in the water-bearing materials. The following factors for a single reservoir or aquifer must be determined: 1—its area extent, including its area of outcrop and where it disappears; 2—the nature of the confining materials, above and below; 3—the variations in thickness of the aquifer from place to place; 4—the changes in permeability, both horizontally and vertically; 5—the areal variations in storage capacity; and 6—the piezometric surface, or water-level surface in wells determined in response to measured withdrawals at selected periods of time. 1, 2, 3 and 4 can be determined from logs of wells drilled to or through the aquifer. Recharge is dependent upon available rainfall or surface water storage along the outcrop, and on the infiltration rate through the soil and subsoil. Where a drainage basin is entirely in the outcrop area, natural discharge can be approximated from the known rating curves of streams which show groundwater flow as the base, during periods of little rainfall. Discharge from wells that draw from this aquifer can be measured directly. For the ultimate solution to the problem of prediction and practice, mathematical control is indispensable. It is often possible to determine hydrologic properties of an aquifer by running controlled pumping tests, determining the resultant drawdown in nearby observation wells and the recovery of water level after pumping ceases. The author describes a calculation, using the "infinite mathematical analogy," modified by assumption of "image wells," with a practical application to Cambridge, Md.

William C. Rasmussen—"Yield of Ground Water Reservoirs Calculated by Geo-Mathematical Analogy;" *1952 Proceedings, Maryland-Delaware Water and Sewage Ass'n.*

### Novel Features In a Filter Plant

A 30-year old filter plant at Springfield, Tenn., seriously inadequate, was replaced with an entirely new one in another location in 1950. This contained some new features which have proved very satisfactory. Among these the sedimentation basin is especially prominent. This was constructed in two sections for parallel operation, providing 4 hr. detention. In each basin a distribution trough runs down the middle, and an effluent collection trough between this and each side, adjustable vertically. Baffles were set, one on each side of the distributing trough and sloping away from it at an angle of 30° from the vertical. The water flows down between the diverging baffles, thus decreasing in velocity; then passes under the baffles and up through the outer spaces which also increase in width toward the surface. Thus the velocity of flow decreases continuously from its entrance to its four overflow weirs provided by the two edges of each trough. The bottom of the basin is constructed of inverted pyramids or hoppers which drain to an underdrain system, permitting periodic desludging. The four rapid sand filters have, instead of the conventional hydraulic rate-of-flow controllers, two sight wells lined with white tile and equipped with a vapor-proof light and plate glass cover. For rate control, water enters this through brass orifice plates, the head over which is maintained by a Klipfel float valve.

J. Wiley Finney, Jr.—"Turbidity and Odor Problems Overcome in Filter Plant Design;" *PUBLIC WORKS*, November.

### Intakes on Variable Streams

Streams may be variable because of fluctuations in flow and level, by change in shore line, and in power to transport heavy loads with resultant shifting of the bottom. Other intake problems are those due to ice, drift and floating materials. The problems cannot always be solved by ponderous structures because small plants cannot afford them, and they are not always amenable to ready solution of unforeseeable problems. Intakes consisting of pumps on barges or on inclined tracks often offer the best solution to the difficulties of exceptional low

water and flood, and bed load problems. Careful selection of site may solve many of the problems. Screening should be the minimum necessary to prevent damage to the pumps. In selecting both the flood height and the extreme low level for which the intake is designed, allowance should be made for a considerable margin above and below any record information. Maximum operating efficiency of pumps requires consideration of the variability of head. The structure must be designed to resist drift, ice and impact of river craft. Government permits may be necessary. Gravel packed wells or horizontal collection-type infiltration systems may offer economical solutions.

Vance C. Lischer and Herbert O. Hartung — "Intakes on Variable Streams;" *Journal, Am. Water Works Ass'n*, October.

### Coatings for Steel Pipes

The U. S. Bureau of Reclamation is continuing a program of protective coating investigations in the laboratory and in the field. In June 1949 20 different coatings were applied in 26 different systems. Of the various types, phenolic, vinyl, thiokol, vinyl-thiokol, and neoprene appear to offer the best possibilities. The neoprene and flame-sprayed thiokol linings may frequently be too expensive and time-consuming for application to steel pipe. The phenolic, vinyl and vinyl-thiokol paints are competitive in price with coal-tar enamel, and are sometimes less expensive. In addition, they are unaffected by extreme cold and would generally be easier to apply in the field. At this time there is no evidence that any of these coatings will prove more desirable than coal-tar enamel in the usual exposures that are encountered. In lining with cement mortar, it is important to provide against drying shrinkage unless the lining is to be kept continuously wet in service; using air entraining and pre-shrinking the mortar before applying have been successful. Substantial wrapping of coal-tar enamel is indicated as essential in clay soils. The new cold-applied vinyl and polyethylene tapes appear to be satisfactory for protecting buried pipe, especially on welded field joints.

Graydon E. Burnett and Charles B. Masin—"Developments in Tests of Coatings for Steel Pipe;" *Journal, Am. Water Works Ass'n*, October.

### Capacities Of Spillways

To insure absolute safety, the spillways of dams should be so designed as to be able to pass the maximum possible flood. How great this will be is not predictable with certainty; and to provide for it, if known, would require structures of economically impossible costs. It is necessary to take risk, and it may be acceptable to take, as a basis, floods that occur only once in fifty years. But the scarcity and incompleteness of data, especially in small watersheds, makes the determination of this impossible. The author proposes to overcome the lack of data in time by increasing the observations in area—the hydrometic equivalent of 1,500 to 2,000 French watersheds of 100 sq. km. would, in 10 yrs., equal 15,000 to 20,000 years of observations on any one of these watersheds. The interpolation of the results, account being taken of the known flood probabilities of the larger watersheds, would make possible the more reliable determination of the flood discharges to be adopted for the medium size watersheds.

J. Duffant—"Choice of the Flood

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Discharge for Which the Spillways of a Dam Should Be Designed;" *La Houille Blanche*, July.

### The Oldest Dam in the World

What is believed to be the oldest dam in the world was built 5,000 years ago in Egypt about 30 km south of Cairo. It had a crest 108 m. long about 12 m. above the lowest part of the river bed. Calculations of the runoff of the watershed above and the capacity of the reservoir created and other considerations indicate that it was soon overtopped and the central part washed away. It was a rock-fill dam, with the faces made of limestone blocks about 1 ft. thick, laid up dry. The ends of the dam still remain. There is no knowledge of any other dam having been constructed in Egypt for nearly 3,000 yrs. afterward.

"The Oldest Dam in the World;" *La Houille Blanche*, May-June.

### Ductile Iron For Water Pipe

Within the last four years there has begun the commercial production of ductile iron, also called magnesium - containing, spheroidal graphite, or nodular iron. The addition of approximately 0.05% of magnesium to typical gray iron produces a material having good fluidity, high yield and tensile strength, and toughness. The bursting tensile strength of ductile iron is 52,000-62,000 psi. It fails with some plastic deformation rather than shattering. Pipe walls can be reduced at least 1/3 in thickness for any given class of working pressure.

C. T. Haller—"Ductile Iron—a New Engineering Material for Water Works Construction;" *Journal, Am. Water Works Ass'n*, October.

### Experiences With Fluoridating

In January, 1952 a public health dentist sent a questionnaire to 127 communities which were fluoridating their water supplies and received replies from 98. Of these, 51 had begun this service during 1951 and 24 during 1950. All reported no difficulty in obtaining the chemical, which was sodium fluoride in 53 cases, sodium silico fluoride in 41, hydrofluosilic acid in 3 and hydrofluoric acid in 1. The fluorine dosages applied varied from 0.5 ppm in summer in southern states to 1.4 ppm in winter in the northern states. Fluoridation was financed from water revenue in 88 cities; from general funds in 6; from health de-


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GLAND, bronze-bushed, extra long, allows maximum take-up on packing.
STUFFING BOX, cast iron, bronze-bushed, generous depth permits ample packing without unnecessary tightness.
STUFFING BOX BOLTS, tee-head, rust-proofed steel, with durable bronze nuts, give long-lived service.
BONNET (and body), Kennedy Higher-Strength cast iron. All bearing surfaces bronze-bushed or bronze-faced for corrosion resistance, extra durability. Thick metal throughout for maximum strength.
STEM, manganese bronze, large diameter with exceptionally high tensile and torsional strength, extra contact threads to prevent stripping.
STEM NUT, manganese bronze, operates independently, prevents stem from binding, springing or bending... fits into disc tops and releases one before the other, to prevent sticking or locking on opening.
DISC RINGS, bronze, each with accurately formed tongue forced into dovetailed groove in disc under heavy pressure for solid, leakproof joint.
SEAT RINGS, heavy bronze, threaded and screwed into body, removable, interchangeable, easily replaced when necessary.
DISCS, Kennedy Higher-Strength cast iron, with bronze wedge seats, discs deeply ribbed to eliminate distortion.
WEDGES, bronze, interchangeable. Combination of bronze wedges, bronze seats, cast iron hooks prevents corrosion trouble in mechanism.
HOOKS, cast iron, extremely heavy, arrested by stops at bottom of valve body, hold wedges stationary to force discs tight against valve seat.

*WRITE FOR BULLETIN 106*

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partment funds in 3; one did not specify. The costs reported ranged from "less than 5 cts" per person per year to 16½ cts. Only 20 communities had received any complaints, almost all of which were registered before fluoridation actually began, and included "taste too strong", "killed my goldfish", and "canaries quit singing." Fluoridation was brought about through action by dental, medical and public health groups and an informed public in 96 cases; by public referendum in two. In general it has had "tremendous public support" and is considered inexpensive, safe and beneficial.

Leonard F. Menczer—"Study of 98 Communities Fluoridating Their Communal Water Supply;" *American Journal of Public Health*, November.

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• • •

## Refuse Collection and Disposal in Tennessee

Refuse collection and disposal practices in Tennessee were surveyed by the Tennessee State Planning Commission, covering 14 representative cities and one county area. All of these used the sanitary landfill method for disposal, though one city also employed incineration. Costs for refuse collection and disposal ranged from $1.53 per capita per year to $3.55. Six cities under 10,000 population averaged $2.53; three cities and the county area, with populations ranging from 10,000 to 25,000 averaged $2.46 per capita; and one city in the 25,000 to 50,000 group, reported a cost of $2.00. Costs for the four largest cities were not given. Overall pay for labor was reported to average 86 cents an hour, with a work week of 43 hours; for truck drivers average pay was 97 cents; and for tractor operators it was $1.19.

Elizabethton has been using the landfill method for four years. A 7-acre tract just outside the city limits is utilized for disposal. The soil is rocky and sandy, but otherwise well suited for landfill. A tractor, with attachments, capable of digging, compacting and filling, was purchased for $9,000. No other use is made of this equipment, as the difficulty of transportation makes other uses generally unprofitable. This unit, after four years of service, is considered about ready for replacement; if possible, a type will be purchased which can be used on other work also. The possibility of using a tractor having pneumatic tires is being investigated.

• • •

## Prefabricated Sheeting Speeds Up Sewer Construction

Laying of a relief sewer involving pipe from 54-inch to 102-inch in size in Middletown, Ohio, is described in the "Marion Groundhog." In place of driving piling along the line of the sewer in the usual manner, the contractor constructed a fabricated steel form or box, which is moved forward along the trench as the work progresses. The form is of structural steel, braced at the ends, with sides of sheet steel. Width is adjustable. Length between braces permits lowering an 18-ft. section of pipe into the trench. Forward movement is by pulling by the Marion backhoe used for trenching. Largest single day's work was 144 ft. (eight 18-ft. sections) of pipe, involving 1600 cu. yds. of trench excavation. Average trench width at the top was 14 ft.; depth varied from 17 to 25 ft. Use of this movable sheeting form eliminated the necessity for normal trench sheeting procedures. Contractors were Burch Construction Co. and Haddad Construction Co., working jointly.

• • •

## Parking Pays the Bill

(*Continued from page* 59)

"Purchasing power that is actually expended determines the importance of a business district." This is based on studies which show that shoppers, using cars more and more, must stop in the business district if they are to spend money there. And —the amount of spending is increasingly dependent upon the capacity of a business district to absorb cars. "This should be a matter of great community concern."

The value of land in commercial centers is declining. "While it is unreasonable to attribute the decline to any single cause," the BPR continues, "the evidence indicates that a major factor is the inability of the area to discharge its transportation

responsibilities in a manner attractive to persons who seek to do business there."

Further, this report observed that the impact of more and more cars trying to move and park in less and less space results in crippling congestion.

Business people in Portland could see all of this happening before their eyes. Some movement had already started toward the suburbs, following the pattern of business movement in other cities, but there was time to head it off by correcting the growing confusion in the downtown area. So merchants and other interested persons were ready to work with city officials to bring order out of the growing chaos.

The consulting engineer firm of DeLeuw, Cather & Company, of Chicago, was retained to bring out specific recommendations. These supported the proposal of Fred Fowler, Traffic Engineer, to shift to one-way traffic in the downtown grid.

### *The One-Way Traffic Plan*

He had studied the plan for ten years, and in January, 1946, he had submitted a "Report on Traffic Congestion and the One-Way Traffic Plan" to the City Council. Three years were then spent on hearings and conferences with the Chamber of Commerce, Retail Trade Bureau, and other groups. Approval was won in the Traffic Safety Commission, the Transportation Planning Commission, and the Planning Commission. The plan was adopted by the council on January 11, 1949, with an appropriation of $80,000.

At this time three street car lines were operating in the one-way area. The Traction Company agreed to replace them with motor buses by August 25, but due to inability to get equipment this date had to be extended to February 28, 1950.

This one-way grid is made up of 200 ft. square blocks and 21 miles of streets. The north-and-south avenues are 80 ft. wide with 50 ft. between curbs. East-and-west streets are 60 ft. wide and 36 ft. between curbs. The east-west streets were marked with four 9 ft. lanes, even though traction equipment 9 ft. wide was operating on them.

Street car and bus loading, left turns, and the resultant jams were responsible for most of the delays. It was impossible to time the traffic lights in direction-progression. Movement of traffic was down to 6.4 miles per hour. During the peak hours, even though left turns were banned, the speed was less than 6 miles per hour.

The public's reaction to any radical change is to be "agin" it, as a rule. Knowing this, the preparation for the change is one of the most remarkable features of the shift. Instead of suddenly confronting motorists with a new-fangled scheme for "regimenting" them, two steps were taken. In November the north-south avenues were marked for three lanes, two of these in the direction of the future one-way movement. Only one was left for traffic going in the opposite direction.

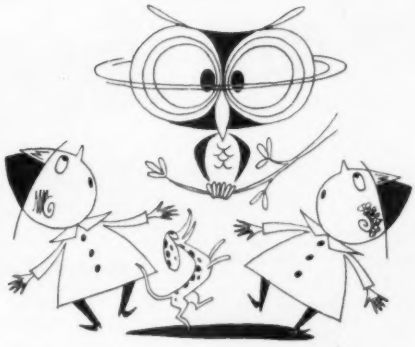
At the same time the signals were timed for 15 miles per hour in the direction of the future one-way travel.

These two changes made travel in "the way they should go" so much easier and faster that motorists rapidly educated themselves to using the less congested lanes.

### *Preparing the Way*

Much had to be done between this beginning in November, 1949, and taking the second step on February 27, 1950. Permanent one-way signs were installed at the far right and left corners of every intersection in the grid. These were covered with paper. In addition, illuminated one-


# Head turns all the way around



Nozzle direction may be changed easily and at any time by simply loosening the bolts in the swivel flange and turning the head . . . The number and size of nozzle outlets can be changed by replacing the head, and without shutting off the water.

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way signs were hung overhead at each signalized intersection. These were designed in the traffic engineer's office, and made in Portland. The aluminum box has two cold cathode U-tube lamps, and a white plastic front, 24" x 30", on which the one-way arrow is painted.

Another job was to paint arrows in the direction of the one-way flow in each traffic lane, at each intersection. Signs were made to warn motorists at every entrance to the one-way grid, and signs saying "You are now leaving the one-way area."

To make sure that the inauguration of the new system would cause no confusion or mistakes, 128 policemen were trained to instruct motorists, and to handle any mistakes that might occur.

The grand opening was on a Sunday. When Portlanders drove down town that morning the paper coverings had been removed from the new signals, portable wooden barriers stood at every intersection to stop drivers who tried to follow their former routes, the new signs were in place, and at every turn a genial policeman waved drivers into their proper streets and grooves.

Monday morning, with its heavy traffic, was expected to be the real test. Many mistakes were made and corrected. Vehicles piled up here and there in momentary jams, but there was no accident. After three days the specially trained policemen were sent back to their regular duties. Portland had accepted the change.

On the first Saturday, however, the city had one of its worst jams. Many things accumulated to cause it. Nearly everybody in the city and from far outside came to see the system work. Since that day there has been no major tie-up, even with more and more cars in town.

The bill was $73,000. It included the erection of 1,050 signs, hanging 220 illuminated signs, moving 1,800 parking meters to accommodate left-hand parking, changing signal heads at 60 intersections, installing 30 new traffic signals, and a vast amount of painting—center lines, stop lines, direction lines, lane dividers, cross walks and arrows.

One figure on the cost of the former, two-way, system may be used to soften the impact of the bill for the one-way plan. The Oregon State Highway Department deduced from its study of traffic that motorists were losing over $200,000 a year in loss of time, and this did not include the loss to business concerns whose commercial vehicles got caught in the jams.

Here are other figures for evaluating the change. Every street is carrying from 5% to 105% more traffic than before. Traffic movement has speeded up from 5.55 to 14.2 miles per hour. One secondary street which showed an increase of over 100% in traffic volume, also has a higher speed, even though it is now used by buses. It had neither street cars nor buses before.

Portland has ceased to be a trap for the through-motorist, because now the traffic lights are timed in waves. Where formerly it took 79 seconds for a car to get through the grid area, a driver can now go across in 7.25 seconds. This saving of time is especially remarkable because the volume of traffic has increased at least 15% over the number of vehicles counted in 1946.

Even before the one-way system was authorized, Fred Fowler had analyzed the movement of cars at intersections until it seemed that he had anticipated every possible happening; the ways that cars could turn; the ways that they could encounter pedestrians and other cars; and the ways in which jams could occur.

The analyses were all that they could be. But no analysis projected into the future on assumptions can

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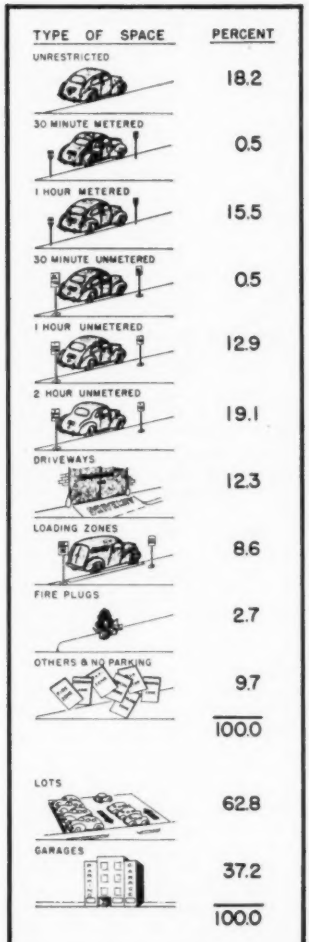
be an accurate pre-view of what actually takes place. Certainly only commendation is due the designer when such a study comes as near to perfection as Fowler's did. As happened, not all the assumptions worked out.

The major disappointment was that the traction company did not move its bus stops to the far side of intersections. Therefore the buses, stopping singly or two-together, still impede the smooth flow of traffic at the intersections, and interfere with the turning of cars. How this compounds the situation was very noticeable during the December buying rush, when more shoppers' cars were trying to park and un-park and pick up passengers. *(See p 122)*

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One comment that should be made concerns the business houses in every city struggling with its traffic, and trying to keep its business district hospitable to shoppers. The comment is no more applicable to Portland than to any other such city, but we happen to have accurate figures about the condition in Portland.

In the picture graph "CURB PARKING—Number of Spaces" at least 20% of all spaces are forbidden to motorists, and very likely more. Over 12% of these are driveways. Many driveways are used so little—in all cities—that they could be opened to parking from 9 to 4. Some are never used. The basic law governing traffic regulation goes back to the English law which gives a householder unrestricted ingress and egress, and it may be impossible to open such driveways for any part of the day. We have stomped over so many other rights of citizens for the good of the public that we are loath to go any farther.

In the same way business houses are claiming 8.6% of all parking spaces for loading and unloading zones. Many of these are empty most of the day. Motorists are afraid to use them even at night. Merchants are merely holding the right to use the space if and when they need to. Many of these zones could be opened during the middle of the day. Also, to hold 9.7% of all spaces for "Others and No Parking" is out of harmony with the avowed purpose of the whole system, unless the need for these reservations can be proved to be as pressing as the need for absorbing more cars in the business district during shoppers' hours.

When these three classifications are added up, 30.6% of all parking spaces are empty, except for occasional use. The one imperative reservation is for fire plugs, yet only 2.7% of all the potential parking spaces are set aside for this purpose. Comparing 2.7% for this indisputable need, with 30.6% for three uses which at least could be made flexible, opens the gate for a train of questions about the degree of detachment with which this part of any city's plan is studied through.

One of the main causes of jams during the evening rush hour is the clutter of cars waiting for people at stores, office buildings, markets and government offices. If these dallying cars could only find a place to hole up until their passengers come —often not more than five minutes —they would get out of the way. Instead they drift slowly round and round until they make connections.

If businessmen want traffic regulated so the threat of movement of business to the suburbs is at least delayed, they will open all possible parking spaces to motorists during the evening rush. Cities might properly consider taking off all parking bans between 5 and 6.

The frequency of accidents is another measure of the value of the one-way system. Accidents increased considerably during February. The greater number were in right-angle collisions at intersections just outside the one-way grid. Others were caused by turning from the wrong lane at intersections. More pedestrians were hurt. But only three of the accidents involved violation of the one-way rule. The others came of not knowing how to drive in the new system. That points up the need for even more intensive training of the public than the thorough publicity campaign in Portland.

During March, the first full month of operation, there were 584 accidents, compared with 427 in March of 1949; a 37% increase. In April the figure was 473, against 414 in April of the year before, a 14% increase. But the city as a whole had an 18% increase over that month of the previous year.

In May there were only 424, 2% under the previous year. Injury accidents were down 41% and pedestrian accidents down 59%. The city as a whole had an increase of 9%.

Not many things would be changed if Portland were to do the job over today. More direction and instruction signals would certainly be put up at intersections just outside the grid area, to carry cars farther away before releasing them from rigid control. More lights were installed after the need became apparent.

Something more might be done to protect and control pedestrians. Just how much more can be done is not clearly seen. The one-way system has not solved the problem. Right-turning vehicles are still stopped by pedestrians at the cross walks, and cars pile up behind them. Left turns are permitted into one-way streets, and while there is less of this, it is still a threat to persons on foot. The walk-wait lights are accepted, quite properly, by pedestrians as their special protection, yet full protection is not provided against turning cars.

Looking at Portland's control of traffic as a whole, one thing is impressive to every observer. That is the order observed by pedestrians and cars. How this city has accomplished this mutual respect, and

(*Please turn to page* 129)

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# *Public Works* EQUIPMENT NEWS

## Anchor for Underground Insulated Piping Reduces Heat Loss

If you want to convey hot or cold liquids or gases, this device will give you an anchor for the pipe line and will also minimize heat loss at anchorage points and prevent pipeline corrosion due to electrolytic action. The anchor is insulated from the line both thermally and electrically. For technical details, write Durant Insulated Pipe Co., Warren Way and Bay Road, Palo Alto, Calif.

Use coupon on page 32; circle No. 12-1

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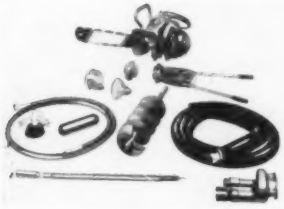
## You Can Do Most Anything With This Tool

This combination gasoline engine and chain saw has other attachments so that



Power unit, saw and tools.

you can use it as (1) an earth auger; (2) a wood drill; (3) a concrete vibrator; (4) a concrete surfacer; and (5) a sump pump. As a pump, it handles about 8,000 gph. For more data write Mall Tool Co., 7725 South Chicago Ave., Chicago 19, Ill.

Use coupon on page 32; circle No. 12-2

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## Ultra-Modern Electric Generator for Standby

This is a 10kw generating unit with an air-cooled engine. It can be provided with electric starting or with controls which will automatically start the unit the instant that power fails. Available for single or 3-phase service at standard or special voltage. More from Universal Motor Co., 494 Universal Drive, Oshkosh, Wisc.

Use coupon on page 32; circle No.12-3

Communications Center for CD

## Mobile 8-Station CD Communications Center

An 8-transmitter mobile communications center for civil defense has been built for Philadelphia to provide every type of modern communication. Housed in a truck which generates its own electric power, the unit is highly mobile and can move outside the city. A crew of 8 men is required for operation. It has black-out curtains, a public address system, 4 floodlights, sirens, flashing red lights and 16 phones. It is equipped for 2-way communications with police cars and police headquarters and with fire stations and fire base stations. It transmits and receives on one CAA frequency which will reach planes overhead. It receives and transmits on 3 different channels reserved for "hams." An Onan electric plant furnishes the power and more data can be obtained from D. W. Onan & Sons, Inc., Minneapolis 14, Minn.

Use coupon on page 32; circle No. 12-4

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## Fast-Drying Rubberized Traffic Paint

This new rubberized traffic paint is claimed to dry in 3 to 5 minutes on concrete or asphalt pavements and in 5 to 7 minutes on brick pavements. This quick-drying action save time and labor and reduces interference with traffic. It may be applied at temperatures as low as zero. It is claimed to last 75 per cent longer than many other paints. It is available in white or yellow, with or without beads. Prices and details from O'Brien Corp., South Bend 21, Indiana.

Use coupon on page 32; circle No. 12-5

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## Helps to Tell If Snow is On the Way

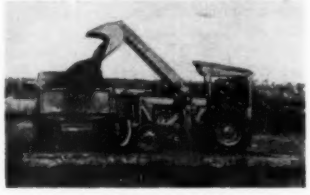
This "snow detector" unit is only a little more than 7 ins. in diameter, but it will detect precipitation when the temperature drops below 37°F, the normal borderline for snow. It is useful for automatically controlling sidewalk snow removal systems and heaters for switches or similar installations. Even severe icing or snow will not adversely affect operation. It will turn on heating elements whenever icing conditions exist and will turn them off when the icing hazard is past. Full technical data from Motorola Communications & Electronics Division, 4545 W. Augusta Blvd., Chicago 51, Ill.

Use coupon on page 32; circle No. 12-6

★

## Combination Loader, Bulldozer and Crane on Tractor

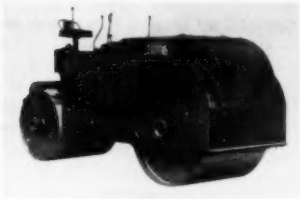
Using an Oliver wheel tractor, this unit carries a loader that digs at either end,



Oliver loader and bulldozer

swings its load overhead and loads in front, saving time in loading operations. With the bulldozer-angledozer blade mounted on the loader, the tractor is ready for bulldozing. The loader bucket may be removed and replaced with a crane for handling pipe, hydrants or other heavy objects. Full data from Oliver Corp., Cleveland 17, Ohio.

Use coupon on page 32; circle No. 12-7



2-axle tandem roller

### Two-Axle Tandem Roller with Many Advantages

Among the advantages claimed for this new roller are: open grill-work over both sides of the drive roll which allows the operator to see the roll edge directly; increased ground clearance of 17 to 20 ins.; easy access to the transmission and the engine; better controls and better operator facilities. This is the C Model. More information from Buffalo-Springfield Roller Co., Springfield, Ohio.

Use coupon on page 32; circle No. 12-8

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### Heavy-Duty High-Capacity Steam Cleaner

This new steam cleaner can discharge up to 540 gals. per hour of detergent spray and/or hot or cold pressure rinse. Equipment includes an insulated cleaning gun, a rinse gun, two sets of delivery hose and 150 ft. of heavy duty cable. It operates on 220-volt 60-cycle, single phase current. Height is 48 ins., length 88 ins., and width 34 ins.; weight is 2000 pounds. Detailed specifications on letterhead application to Clayton Mfg. Co., El Monte, Calif.

Use coupon on page 32; circle No. 12-9

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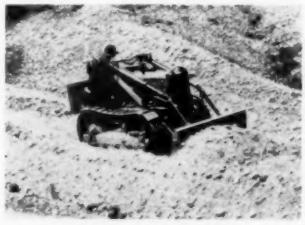
### Small Crawler Tractor for Many City and County Jobs

If you have jobs to do such as these: bulldozing, snow removal, backfilling trenches or excavations; loading material; winch operations; cleaning ditches or other areas; landscaping, or street or road maintenance of the lighter sort—here is a 3600-pound crawler tractor with 21.85 drawbar hp and 26.36 belt hp. It has all kinds of attachments for its more effective use: bulldozer, trailbuilder, front end loader; lifting fork; sidewalk snow plow, hydraulic drawbar, and winch. More data from Oliver Corp., 19300 Euclid Ave., Cleveland 17, Ohio.



Oliver OC-3 tractor

Use coupon on page 32; circle No. 12-10

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### Rubber-Tired Tractor with 4-wheel Drive

This new tractor is designed for heavy-duty drawbar and pushing work, especially where maneuverability is necessary. Compact design and short wheel base, with sharp turning radius and power booster steer, make it highly adaptable to work in close quarters. Engine is 106 hp gasoline or 90 hp diesel; weight is 25,000 pounds; drawbar pull is 14,000 to 16,000 pounds. Ask for data on Model TM Payloader. Frank G. Hough Co., Libertyville, Ill.

Use coupon on page 32; circle No. 12-11

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### Flexible Plastic Pipes Made of Polyethylene

Two types of plastic pipe, flexible and semi-rigid, have been announced by Triangle. Later, rigid and high-impact pipe will be added. The flexible pipe will be made of polyethylene and will be of three types—non-toxic in sizes up to 6-inch for water


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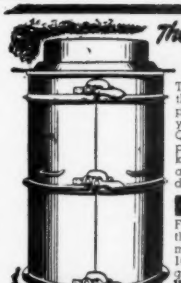

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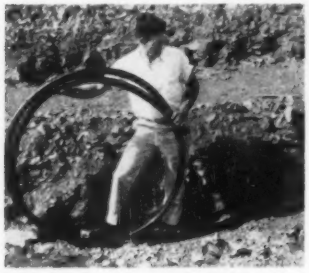
and similar application; industrial for sewage, industrial wastes and chemical plants; and suction, which is designed for higher pressures than the other types. The semi-rigid



Triangle flexible pipe

pipe is made of butyrate, through 6-inch size, 20-ft. lengths. More on all these types from Plastic Products Division, Triangle Conduit and Cable Co., Inc., New Brunswick, N. J.

Use coupon on page 32; circle No. 12-12

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## Corrosion Resistant Tape for Wrapping Pipes

Where pipe lines are subjected to corrosion, as in cinder fills, in acid soils or at river crossings, they can be protected by wrapping with this tape. It can be used above ground, under ground or under water, and for pipe sections and/or joints. The tapes —two of them are available, No. 50 and No. 51—are of poly-vinyl chloride. Without the use of tar pots or similar equipment,

Pipe wrap without pinholes

they provide a pinhole-free cold coating. More data and a convenient reference table from Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.

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## Engine-Driven, Pull-Type Road Sweeper

This new power sweeper has a 30-inch diameter 96-inch long broom that is quickly set at a 30° angle to sweep a 78-inch path either right or left. A balance spring cor-

Road sweeper by Meili-Blumberg

rects difficulties due to uneven surfaces. Vertical control of the brush is by hydraulic power. The brush is set to operate at 140 rpm, but can be changed. A sprinkler attachment is available. Engine is a Wisconsin VE4. Fuller information on this 53M broom and on other brooms from Meili-Blumberg Corp., New Holstein, Wisc.

Use coupon on page 32; circle No. 12-14

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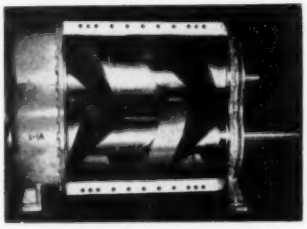
## New Type of Compressor Has Many Advantages

Designed to bridge the gap between the conventional rotary positive and centrifugal



New Roots air compressor

compressors, this new type of compressor employs two inter-meshing screw-rotors which operate in opposite directions. Advantages are peak efficiencies, no internal lubrication requirements, less servicing, low noise level and light weight. This new unit is described in a technical booklet. Ask for Bulletin SC-152 from Roots-Connersville Blower, Connersville, Indiana.

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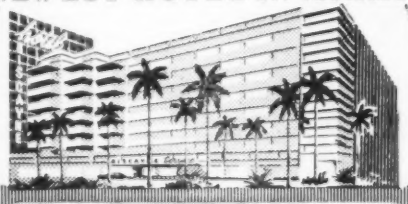

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Use coupon on page 32; circle No. 12-16

## BOOKS IN BRIEF

**SANITATION PRACTICES**

This is a 46-page report on "sanitation practices in local health departments." This is very largely (if not wholly) the work of L. M. Fisher, formerly of the Public Health Service and now Engineering Field Associate of the American Public Health Association. The report contains analyses of daily activity reports submitted by some 370 sanitation workers in 42 local health departments in 22 states, covering the year 1951. The long experience and sound judgment of Mr. Fisher are essential components in making this study a valuable one. It is published by the APHA, 1790 Broadway, New York 19, N. Y.

**FARMER'S ALMANAC**

The Farmers' Almanac for 1953, tells a lot of things that engineers should know (maybe)—there will be no occultations in 1953, but what about a perihelion and aphelion? Do you want to know whether or not there will be snow on Feb. 9? Or how to concoct a banana split? All these, and a few million other items of assorted information can be found in this 161st annual continuous edition. 25 cents from Yankee, Inc., Dublin, N. H.

**GUNITE HANDBOOK**

This book, which is available to those requesting it on their business letter head, presents technical data, illustrations, drawings and specifications of most of the typical uses of Gunite and other cement gun applications. 50 pages. Gunite Construction Corp., New York, N. Y.

**BAY CITY REPORT**

The annual report of Bay City, Mich., as published in the Bay City Times for Sunday, August 24, 1952, presents a fine record of the activities of the municipal government during the preceding year. Other cities will find a good many valuable ideas in this report, which was sent us by R. K. McGillivray, Director of Public Works.

**FIRST OHIO WATER CLINIC**

This 154-page text contains the papers presented at the first Ohio Water Clinic held at Ohio State University in February, 1952. Copies are $1. Engineering Experiment Station, Ohio State University, Columbus 10, Ohio.

**UNDERGROUND POLLUTION**

Factual information on the importance of ground water in Southern California and on pollution that may affect the quality of the ground water. Copies on request. Regional Water Pollution Control Board No. 4, Spring-Arcade Bldg., 541 South Spring St., Los Angeles 13, Calif.

**PERSONNEL TESTS & EMPLOYEE RELATIONS**

This is a special catalog of personnel tests and employee relations materials, developed for business and industrial use by Science Research Associates, 57 W. Grand Ave., Chicago 10, Ill. Sent on request.


**SALES ENGINEER WANTED**

Sales engineer, sanitary or chemical, to work out of Indianapolis. Travel will be required. Training will be given in a field dealing with municipalities, engineers and industries. Write fully and enclose recent small photograph. Address MO, % Public Works Magazine. Letters will be forwarded without acknowledgment.

**STREET, SEWER AND WATER CASTINGS**

Various Styles, Sizes and Weights
Manhole Covers and Steps
Adjustable Curb Inlets
Water Meter Covers
Cistern and Coal Hole Covers
Gutter Crossing Plates
Valve and Lamphole Covers

*Write for Catalog and Prices*

**SOUTH BEND FOUNDRY CO.**
*Gray Iron and Semi-Steel Castings*
SOUTH BEND 23, INDIANA

• *USED* •
**EQUIPMENT**
*and*
**CLASSIFIED ADVERTISING**

**FOR SALE**

General 420 Backhoe boom stick and bucket — 99% condition.

**RIEMER BROS., INC.**
6301 West Fletcher St.
Chicago 34, Illinois

**REPRESENTATIVES WANTED**

**Manufacturer's representatives wanted in Buffalo, Indianapolis, and Minneapolis areas for maker of liquid level controls of the floatless, electrode type. Address CONTROLS care PUBLIC WORKS. Replies will be forwarded but not acknowledged.**

**FOR SALE**

City of Englewood, N. J. has eliminated a Pumping Station and has for sale:

2—4" Fairbanks Morse 5 H.P. Motor Driven Trash Pump.
1—4" Fairbanks Morse 7½ H.P. Motor Driven Trash Pump.
1—5" Fairbanks Morse 15 H.P. Motor Driven Trash Pump.

Later also Engine Drive

1 Each Fairbanks Morse Electric Motor Frame for 500 GPM, 700 GPM and 1200 GPM Pumps.

Various valves, connections, etc. in connection with above, also recording Venturi Tube Meter. List of items can be had upon application.

**CITY OF ENGLEWOOD,**
Municipal Bldg.,
Englewood, N. J.

**BOILER FEED PUMPS**

2—Al.-Ch. 400 G.P.M., type ML, 6 stage, size 5x4, 1614 Ft. Hd.
1—Worth. 740 G.P.M., type WCS-2, 5", 2250 Ft. Hd.
1—Worth. 700 G.P.M., type UNS-1, 6 stage, 6", 1550 Ft. Hd.
2—I.R. 200 G.P.M., 2", 1375 Ft. Hd.
Pumps above are mounted on basis for motor or turbine drive.

*We have about 200 various size cent. pumps on hand, turbine, motor, and gasoline driven. Send us your inq.*

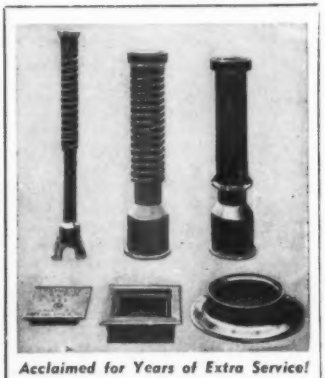
**DALTON SUPPLY CO.**
2829 Cedar St. Phila. 34, Pa.

the search for PURE WATER
354 B. C.
"Hippocrates' sleeve" (a cloth straining bag) was a popular water treatment method in the 4th Century B. C.

For excellence in MODERN water treatment equipment —gravity and pressure filters—recirculation apparatus...

MECHANICAL EQUIPMENT BY ROBERTS FILTER MFG. CO. DARBY, PENNA.

**ROBERTS FILTER**
**MANUFACTURING CO.**
640 COLUMBIA AVE., DARBY, PA.



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**FAMOUS "Buffalo" CAST IRON SERVICE, VALVE & ROADWAY BOXES for WATER and GAS!**

Buffalo boxes are a development of many years of experience in the water and gas field. All new designs are interchangeable with older Buffalo type boxes. Buffalo boxes are heavier, of more rugged construction, which means years of extra service. Also Manhole Covers and Frames, Square Head Service Boxes, Gas Drip Boxes & Stop Cock Holders.

*Write to Dep't H for Bulletin No. 33.*

**BUFFALO PIPE and FOUNDRY CORP.**
Box 33, Station B — Delaware 8764 — Buffalo, N. Y.


## INDEX OF ADVERTISEMENTS


Ace Pipe Cleaning Contractors, Inc. ..... 100
Alabama Pipe Co. ..... 99
Albright & Friel, Inc. ..... 121
Alvord, Burdick & Howson ..... 121
Aqua Survey & Instrument Co. ..... 42
Armco Drainage & Metal Prod. ..... 6
Austin-Western Co. ..... 24
Ayer-McCarel-Reagan Clay Co. ..... 8 & 9
Baker, Jr., Michael ..... 121
Bannister Engineering Co. ..... 121
Barber-Greene Co. ..... 17
Barker & Wheeler ..... 121
Biscarne Terrace Hotel ..... 126
Black & Veatch ..... 121
Blackburn Smith Mfg. Co. ..... 129
Blaw-Knox Division ..... 94
Bogert Assoc., Clinton L. ..... 121
Bowe, Albertson Assoc. ..... 121
Bowerston Shale Co. ..... 8 & 9
Briggs & Stratton Corp. ..... 20
Brown Engineering Co. ..... 121
Brown, Francis L. ..... 121
Buck, Seifert & Jost ..... 121
Bucyrus-Erie Co. ..... 43
Buffalo Meter Co. ..... 19
Buffalo Pipe & Foundry Corp. ..... 128
Buffalo Springfield Roller ..... 53
Builders Providence, Inc. ..... 116
Burgess & Nipple ..... 121
Burns & McDonnell Engr. Co. ..... 131
B/W Controller Corp. ..... 44
Caird, James M. ..... 121
Calgon, Inc. ..... 30
Camp, Dresser & McKee ..... 121
Capitol Engineering Corp. ..... 122
Cast Iron Pipe Research Assn. ..... 88 & 89
Caterpillar Tractor Co. ..... 13
Centriline Corp. ..... 48
Champion Corp. ..... 99
Chester Engineers ..... 122
Chicago Pump Co. ..... 3
Clark-Wilcox Co. ..... 44
Classified Ads ..... 127
Cleveland Trencher Co. ..... 104
Cole & Son, Chas. W. ..... 122
Combustion-Engrg. Superheater, Inc. ..... 39
Consaer, Townsend & Assoc. ..... 122
Continental Steel Corp. ..... 96
Cooper-Bessemer Corp. ..... 131
Corson, Oscar ..... 122
Darley & Co., W. S. ..... 96
DeLeuw, Cather & Co. ..... 122
Dempster Brothers, Inc. ..... 35
Dickey Clay Mfg. Co., W. S. ..... 8 & 9
Dorr Co. ..... 29
Dow, A. W., Inc. ..... 122
Dresser Mfg. Div. ..... 27
Dresser Industries Inc.
(See Dresser Mfg. Div.)
(See Roots-Connersville Blower Corp.)
Ellinor Village ..... 126
Fairbanks-Morse & Co. ..... 31
Federal Enterprises, Inc. ..... 45
Fisher Research Lab., Inc. ..... 125
Flink Company ..... 110
Flexible Sewer-Rod Equipment Co. ..... 107
Ford Meter Box Co. ..... 114
Foster Engr. Corp. ..... 85
Frink Sno-Plows, Inc. ..... 34
Gannett, Fleming Corddry & Carpenter, Inc. ..... 122
Galion Iron Works & Mfg. Co. ..... 41
Gar Wood Industries ..... 33
General Chemical Division ..... 49
Gieseke, George ..... 122
Gilbert Associates, Inc. ..... 122
Gledhill Road Machinery Co. ..... 113
Greeley & Hansen ..... 122
Green Co., Howard R. ..... 122
Hagan Corp. ..... 30
Harte Co., John J. ..... 122
Hasle & Green Engrg. Co. ..... 122
Havens & Emerson ..... 122
Hays Process Co. ..... 96
Haynes Products Co. ..... 94
Healy-Ruff Co. ..... 130
Heltzel Steel Form & Iron Co. ..... 40
Henry Mfg. Co., Inc. ..... 38
Hill & Hill ..... 122
Homelite Corp. ..... 47
Hooper, William T. ..... 123
Hotel Raleigh ..... 106
Hotpoint, Inc. ..... 105
Hough Co., Frank G. ..... 37
Hydraulic Development Corp. ..... 128
Huber Mfg. Co. ..... 2
Infilco, Inc. ..... 18A, 18B & 120
Industrial Materials Co. ..... 8 & 9
International Harvester Co. ..... 4
International Salt Co. ..... 14 & 15
Irving Subway Grating Co. ..... 16
Jaeger Machine Co. ..... 129
Johns Manville Co. ..... 10 & 11
Jones, Henry & Williams ..... 123
Kennedy, Clyde C., Co. ..... 123
Kennedy Valve Mfg. Co. ..... 117
Knowles, Inc., Morris ..... 123
Koehring Co. ..... 38
Komline-Sanderson Engrg. Co. ..... 46
Koppers Co., Inc. ..... 97
Lewis Harold M. ..... 123
Lock Joint Pipe Co. ..... 131
Lozier & Co., Wm. S. ..... 123
Marlow Pumps ..... 52
McConnaughay, K. E. ..... 26
McGraw Hill Book Co. ..... 106
M & H Valve & Fittings Co. ..... 98
McWane Cast Iron Pipe Co. ..... 125
Metcalf & Eddy ..... 123
National Clay Pipe Mfrs., Inc. ..... 103
National Fireproofing Corp. ..... 8 & 9
National Surety Corp. ..... 50
Norton Company ..... 55
Oliver Corp. ..... 21
Onan & Sons, D. W. ..... 113
Oshkosh Motor Truck Inc. ..... 54
Pacific Flush Tank Co. ..... 87
Pacific States Cast Iron Pipe Co. ..... 125
Palmer & Baker, Inc. ..... 123
Permutit Co. ..... 95
Phelps Dodge Refining Corp. ..... 18
Phelps, Inc., Boyd E. ..... 123
Pirnie Engineers, Malcolm ..... 123
Pitometer Company ..... 123
Pomona Terra-Cotta Co. ..... 8 & 9
Preload Co. ..... 123
Quinn Wire & Iron Works ..... 125
"Quick-Way" Truck Shovel Co. ..... 28
Remington Rand, Inc. ..... 91
Robert & Co. ..... 122
Roberts Filter Mfg. Co. ..... 128
Rockwell Co., W. S. ..... 94
Roots-Connersville Blower Corp. ..... 22
Russell & Axon, ons. Engrs. ..... 123
Shunk Mfg. Co. ..... 130
Skinner Co., M. B. ..... 42
Smith & Gillespie ..... 123
South Bend Foundry Co. ..... 127
Stanley Engineering Co. ..... 123
Stillson Assoc., Alden E. ..... 123
Tarrant Mfg. Co. ..... 93
Texas Vitrified Pipe Co. ..... 8 & 9
Trackson Co. ..... 12
Trickling Filter Floor Institute ..... 8 & 9
U. S. Pipe & Foundry Co. ..... 36
Wallace & Tiernan Co. Inc. ..... Back Cover & 25
Wheeler, C. H. ..... 102
White Co., David ..... 92
White Motor Co. ..... 111
Wolverine Tube Division ..... 56
Wood Co., R. D. ..... 119
Worthington Corp. ..... 23 & 51



**HYDRO-TITE**

**DEPENDABLE JOINTING COMPOUND**
*Seals Bell and Spigot Water Mains*
**Economical—Effective**
**Over 35 Years Of Dependable Performance**

**HYDRAULIC DEVELOPMENT CORP.**
***MAIN SALES OFFICE*** **50 CHURCH ST., N. Y. C.**
*General offices and works* W. Medford Sta., Boston, Mass.

## Parking Pays the Bill

(*Continued from page* 123)

this quiet assurance, is a puzzle. No other city has it. There is no impatience, no jay-walking, and very little jumping of lights. People act as if they had studied a special chapter in Emily Post on street etiquette.

Drivers are equally polite and courteous—to the ridiculous extent of balling up traffic for a block just to let one more person amble leisurely across in front. But in the worst situations there is no raucous horn blowing, and no hot arguments about who did what. Compared with some cities this traffic moves as in a diorama, in which each car and walker performs his act methodically, and precisely on time. And knowing it will be like that—why toot your horn!

No motorist can complain that he can't find directions. No city could have more. He can't complain about officious traffic cops ordering him to the curb for a minor infraction, because you rarely see a cop directing traffic. Even on dark, rainy evenings when you could wish for heaven's sake that you could pause long enough to ask someone how to get where you want to go, there'll be only one or two cops.

There's one uniformed individual riding in a side car, peering at parking meters, who seems to be forever on the job. The "take" in fines, already mentioned, is the best testimonial to the efficiency of his going "round and round." This is one place where that round-and-round way of working pays off.

Portland is a busy city. It is the metropolis of Oregon, and the distributing point for goods of all kinds. It is the office center for engineers and other professional people. Its stores draw trade from far down in California, well up toward Canada, and from Idaho, Montana, Utah, and Nevada. The Oregon country is increasingly popular for vacationing, and the traffic flow from all parts of this country to British Columbia is heavy.

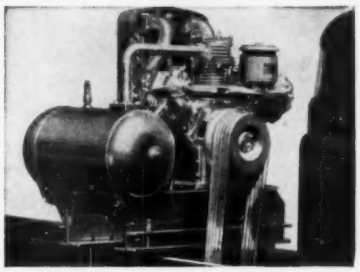
The traffic problem in Portland is not that of one city close to other cities. To try to handle the situation in Portland and for Portland is fruitless. So the sagacious plan to call upon every agency which could contribute any help or knowledge has been successful, and we have one more excellent example of how to approach the problem, and how to apply all we know to the steadily broadening aspects of motor traffic.


**JAEGER TRAVEL-AIR COMPRESSOR**
**with power take-off plus . . .**

**more air-125 cfm**

**no vibration**

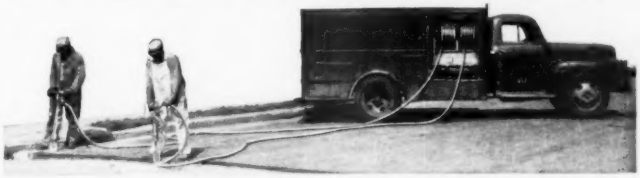
**simple automatic engine speed control**



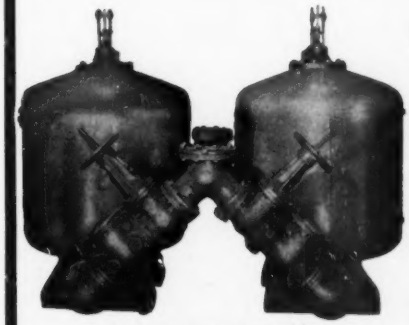
Perfectly balanced "W" compressor, operated thru Cemco power take-off (no gears, only 4 moving parts) keeps 2 heavy breakers working at full efficiency with your truck engine running at easy 1750 rpm (24 mph speedometer). Engine speed automatically regulated to air demands by simple, positive control—no complicated linkage. Send for Catalog TC-1.

*Saves $950 to $1000 first cost and 50% of maintenance compared with trailer types. Mounts on long wheelbase 1½ and 2 ton Chevrolet, Dodge, Ford, GMC, International.*

**THE JAEGER MACHINE CO.,** 400 Dublin Ave., Columbus 16, Ohio
PUMPS • MIXERS • PAVING MACHINERY



**WHEN IT'S TIME FOR A CHANGE—**
**Make it for the BEST, to rugged**



**BLACKBURN-SMITH PNEUMATIC SEWAGE EJECTORS**

**TO LIFT SEWAGE AND SLUDGE AT TREATMENT PLANTS**

**30 to 500 GPM in both single and twin units against high discharge heads.**

**Duplex Sewage Ejector, showing inlet piping.**

Over 50 years service has proved the rugged worth of Blackburn-Smith Ejectors. Yet our today's product is full of exclusive modern features such as:

1. Float and electrical float switch controls.
2. Float and pneumatically controlled snap action valve.
3. Electrode controls.

Any one of the above, with or without Air Receivers.

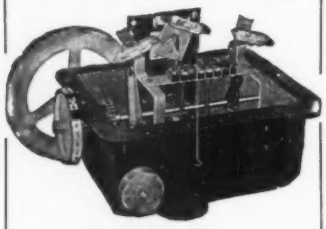
Preferred by most prominent consulting engineers as less messy, more sanitary than centrifugal submerged type sewage ejectors or pumps. Ends screen and pump cleaning. Sewage can be lifted straight up—150—any capacity—once a minute, without fail. Catalog S 50

*REPRESENTATIVES WANTED. ADDRESS:*

**BLACKBURN-SMITH MFG. CO. 93 River St. HOBOKEN, N. J.**

**It's a fact . . . our handy Readers' Service card is the way to get new catalogs.**

ROTO-TROL



RF-2
with ALTO-TROL

*Puts that second pump to work.*

A 2-pump RF-2 ROTO-TROL with a built-in ALTO-TROL will operate each pump on alternate starting cycles, assuring equal use and wear of both pumps. Operates both pumps when required.

Depth Indicator optional — extra.

*Write for full data.*

Water Level Controls Division

HEALY-RUFF Company

791 Hampden Ave., St. Paul 4, Minn.

BLADES for Snow and Ice Removal

FOR ALL MAKES AND MODELS OF SNOW PLOWS

Made of specially developed steel to withstand severe service conditions.

Various widths, lengths, thicknesses—flat or curved—standard or special—punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE

Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

ALLIED

Shunk

MANUFACTURING COMPANY

ESTABLISHED 1854

BUCYRUS, OHIO

# Worth Telling

by Arthur K. Akers

★ **FRANK G. HOUGH COMPANY,** Libertyville, Ill., is now a wholly-owned subsidiary of INTERNATIONAL HARVESTER. Mr. FRANK G. HOUGH continues as president of this subsidiary, we are glad to note.

★ **BARBER-GREENE COMPANY** has moved into its magnificant new office building adjacent to their main plant in Aurora, Ill.

★ **L. E. DEMLER** is manager of WALLACE & TIERNAN'S newly established chemical feeder department which serves also the sanitary engineering field.

Mr. Demler

Mr. Pierpont

★ **NORTON COMPANY,** Worcester, Mass., announces the election of HARLAN T. PIERPONT JR. sales manager, refractories division, as vice president the Special Refractories Association.

★ **MALCOLM SMITH** has been elected a member of the board of directors, BYRON JACKSON COMPANY, Los Angeles.

★ **MARLOW PUMPS,** Ridgewood, N. J., now expands again with a new branch factory in De Queen, Ark., to serve the southwest. This is Marlow's second American plant, their fourth in the world.

★ **VERNON MANDT,** long with JAEGER MACHINE COMPANY, Columbus, Ohio, and later with PETTIBONE-MULLIKEN CORPORATION, is now sales manager, Bushwacker Division, the AMERICAN STEEL DREDGE COMPANY, INC., Fort Wayne, Ind. This Bushwacker eliminates brush and trees up to 6-inches diameter, pronto, they claim.

★ **WESTINGHOUSE ELECTRIC** news includes VICTOR D. KNISS' appointment as general sales manager, consumer products, Pittsburgh. And word of the new 160-foot zeon-tube electric sign that you will see from the trains henceforth as you pass their East Pittsburgh works.

★ **W. M. MERCER** is the new sales manager, MORRIS MACHINE WORKS, Baldwinsville, N.Y.

★ **HIGHWAY EQUIPMENT CO.,** Cedar Rapids, Iowa, has many new distributors appointed, including W. W. Williams Co., Columbus, Ohio; Dow & Co., Buffalo; Syracuse Auto Parts, Syracuse. Product is sand, salt, and cinder spreaders.

★ **LIKE OUR CHILDREN,** HOMELITE CORPORATION, Port Chester, N. Y., "grew up" one day when we were not looking. With hundreds of others, we attended their new Ferguson office building house warming. Growth to 51 factory branches, 938 dealers, and 967 employees highlighted the statistics shown. Vice President NELSON THOMPSON and Advertising manager HOWARD MAXWELL,

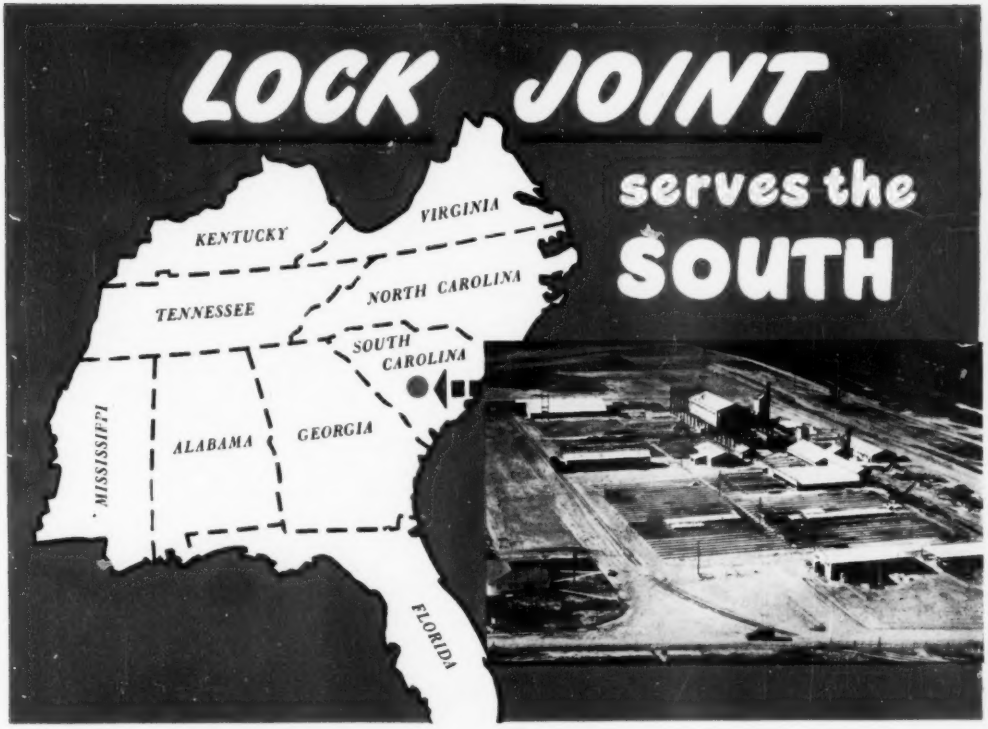
Homelite's new home.

JR. hosted us, ably assisted by a bevy of what our British friends would call "girl guides."

★ **CHECKING** the emergency cases, the new nurse saw the doctor's note on the record: "Shot in the lumbar region."

So-o-o, in the interest of clarity, she changed it to "Shot in the woods."

—*National Safety Council* NEWS LETTER.



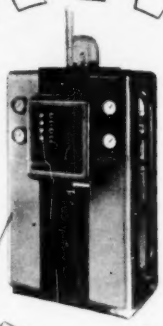

**IF YOU'RE FROM THE SOUTH . . .**
**specifically Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Kentucky or Tennessee** . . . our plant at Columbia, South Carolina, is ready and waiting to serve you. This Columbia plant, the fourth of our up-to-date permanent pressure pipe manufacturing yards, is equipped to produce Lock Joint Prestressed Concrete Cylinder Pipe in diameters from 16" to 48", designed for any pressure common to water works practice. The plant's central location in the Southeast makes it possible to deliver the completed pipe speedily and economically throughout this area.

*IF YOU'RE FROM ANY OTHER PART OF THE COUNTRY EAST OF THE ROCKIES . . . our three other permanent pressure pipe plants located at Wharton, N. J.; Detroit, Mich.; and Turner, Kansas, stand ready to provide for your complete Reinforced Concrete Pressure Pipe requirements. All these plants are equipped to manufacture the most carefully designed modern Concrete Pressure Pipe in a large range of standard diameters, and have facilities to handle any contract however large or small.*

SCOPE OF SERVICES—*Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains 16" in diameter or larger, as well as Concrete Pipes of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous Lines.*

**LOCK JOINT PIPE COMPANY**
*Established 1905*
**P. O. Box 269, East Orange, N. J.**
PRESSURE PIPE PLANTS: Wharton, N. J., Turner, Kan., Detroit, Mich., Columbia, S. C.
BRANCH OFFICES: Casper, Wyo. • Cheyenne, Wyo. • Denver, Col. • Kansas City, Mo. • Valley Park, Mo. • Chicago, Ill. • Rock Island, Ill. • Wichita, Kan. Kenilworth, N. J. • Hartford, Conn. • Tucumcari, N. Mex. • Oklahoma City, Okla. • Tulsa, Okla. • Beloit, Wis. • Hato Rey, P. R. • Caracas, Venezuela

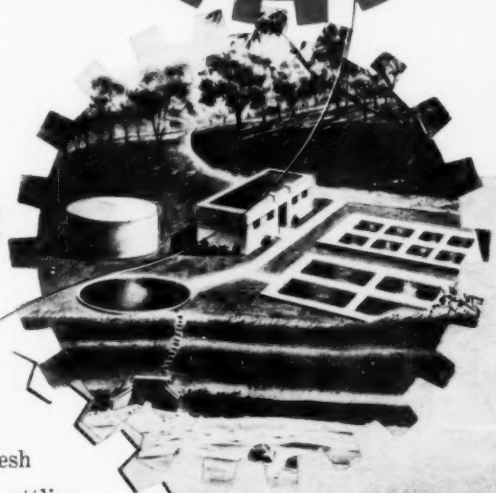
LOCK JOINT
Reinforced Concrete
PRESSURE PIPE



**DISINFECTION**

Chlorine applied up-sewer to prevent septicity subsequently ensures better disinfection at the sewage plant—usually with an overall saving of chlorine.

# CHLORINATION BY W&T *Geared* TO BETTER SEWAGE PLANT PERFORMANCE



**SETTLING BASINS** — Chlorination keeps the sewage fresh and ensures continuance of proper settling in primary basin or Imhoff Tank.

**TRICKLING FILTERS** — Chlorine ahead of tricking filters on a programmed basis prevents septic odors and ponding — thus permitting biological oxidation to proceed normally.

**ACTIVATED SLUDGE UNITS** — Chlorination of the return activated sludge prevents bulking—and permits the activated sludge units to perform at maximum capacity.

Join the hundreds of sewage plants that are maintaining top performance of their treatment processes with chlorination — dependable, accurate chlorination by W&T.

**WALLACE & TIERNAN COMPANY, INC.**

CHLORINE AND CHEMICAL CONTROL EQUIPMENT

NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES

S-73